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ABSTRACT

In accordance with the 1976 Authorization Act of August 7, 1975, the National Science Foundation (NSF) prepared a plan for a Science for Citizens Program to be presented to Congress within six months. The program is designed to improve public understanding of public policy issues involving science and technology, to facilitate the participation of experienced scientists and engineers as well as students in public activities, and to enable non-profit citizens' public interest groups to acquire necessary technical expertise to assist them in dealing with the scientific and technical aspects of public policy issues. This report contains Science for Citizens Program options, an analysis of the information submitted by interested individuals and groups on which the options were based, and a review of the public participation process undertaken by NSF in planning the program. The program options include: registries of scientists and engineers, media programs to increase public understanding, state-based centers to support public programs in science and technology, and establishment of a national clearinghouse with regional branches, forums, conferences, and workshops. (Author/BB)

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This document contains analyses of views expressed by individuals and organizations. It is being circulated for discussion and review prior to final revision.

SCIENCE FOR CITIZENS

A PROGRAM PLAN

OF THE

NATIONAL SCIENCE FOUNDATION

PREPARED FOR THE

COMMITTEE ON LABOR

AND PUBLIC WELFARE

U.S. SENATE

AND THE

COMMITTEE ON SCIENCE

AND TECHNOLOGY

U.S. HOUSE OF REPRESENTATIVES

FEBRUARY 1976

VOLUME I: PROGRAM PLAN OPTIONS AND

SUMMARY OF PUBLIC PARTICIPATION

Part 1: Executive Summary, Program

Options and Other Program Considerations

2

SE 023 796

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Contents

	Executive Summary	i
	Introduction	1
I.	The Public's View of the Science for Citizens Program	I-1
II.	Science for Citizens Program Options	II-1
	Registries of Scientists and Engineers	II-3
	Media Programs to Increase Public Understanding	II-9
	State-based Centers to Support Public Programs in Science and Technology	II-22
	Scientists and Engineers Associates Program	II-32
	Internship Program for Science and Engineering Graduate and Undergraduate Students	II-38
	Establishment of a National Clearinghouse with Regional Branches	II-43
	Establishment of Regional Centers	II-49
	Forums, Conferences and Workshops	II-58
	Grants to Independent Journals	II-63
	Relation of Program Options to SFC Objectives	II-65
III.	Other Program Considerations	III-1
	A. Programs of National Science Foundation	III-3
	B. Related Activities of Federal Agencies Other than NSF	III-16
	C. Program Options not Proposed by NSF	III-22
IV.	The Science for Citizens Planning Process	IV-1
V.	Description of Materials in Volume II, Appendix	V-1

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EXECUTIVE SUMMARY

The 1976 Authorization Act of August 7, 1975, included the mandate that the Foundation prepare a comprehensive plan for a "Science for Citizens" Program to be presented to Congress within six months. The Act provided three objectives to be addressed by the proposed program:

- to improve public understanding of public policy issues involving science and technology
- to facilitate the participation of experienced scientists and engineers as well as graduate and undergraduate students in public activities, including community and citizens group activities, aimed at the resolution of public policy issues having significant scientific and technical aspects; and
- to enable non-profit citizens public interest groups to acquire necessary technical expertise to assist them in dealing with the scientific and technical aspects of public policy issues.

The conference report on the Authorization Act further directed that:

> "This plan is to be prepared with full public participation including: concerned citizens groups; educational institutions; scientific societies; individuals and groups with expertise, experience or interest in improving scientific and technical information; and individuals and groups with expertise, experience or interest in improving the participation of scientists in public policy debates."

This report to the House Committee on Science and Technology and the Senate Labor and Public Welfare Committee is the National Science Foundation response to the Congressional mandate. It contains the Science for Citizens program options, an analysis of the information submitted by interested

individuals and groups on which the program options were based, representative inputs, and a review of the public participation process. Volume II, Appendix, to be published separately, contains materials submitted by the public; a specially commissioned report, "Provision of Federal Assistance to Nonprofit Citizen Groups Dealing with Scientific and Technical Aspects of Public Policy Issues"; prepared by the law firm of Boasberg, Hewes, Finkelstein and Klores (referred to as the Boasberg Report) and other materials.

PROGRAM OPTIONS FOR A SCIENCE FOR CITIZENS PROGRAM

NSF has developed a series of nine options to address the objectives and that respond to the public views expressed during the planning process. These options are based on the needs identified by the public, the legislative authority of the Foundation, and its policies and capabilities.

Many individuals expressed needs that lie outside the scope of NSF authority or that are inappropriate for an agency with NSF's capabilities and resources to address. These are included in the records of the meetings and are addressed to a limited extent in the body of the report. Emphasis, however, is placed on developing those options that respond to the objectives of the program and are within the ability of NSF to implement.

The options presented reflect a flexible approach in that some or all could be undertaken independently, and the emphasis given to each can vary. Before undertaking implementation, detailed development and experimental pilot testing of each option is recommended to assure development of an efficient and effective program. The options identified are:

Registries of Scientists and Engineers

NSF could support the compilation of registries of scientists and engineers interested in serving as resource persons to local decision makers, community and citizens public interest groups and others. These registries would contain information about a person's professional qualifications and experience, and availability on a volunteer or remuneration basis. State and local registries, and a register of persons interested in working with national offices of public interest groups, would be compiled by the professional societies in consultation with citizens public interest groups. Maintenance of lists and facilitation of their use could be accomplished through the national and/or regional clearinghouses and/or regional or State based centers described below.

Media Programs to Increase Public Understanding

NSF could support various types of media programs specifically designed to provide a balanced presentation of major issues and the role that science can play in their resolution. Four examples of the types of programs that could be funded are:

(1) A television series based on the "Advocates" approach, in which pertinent issues such as the environment or energy would be aired. Scientists, engineers, public officials and representatives of citizens public interest groups would participate. Followup to the program could include polling, call-ins, letters, and filling requests for further information. The programs could be distributed to libraries, science centers and museums and schools.

(2) The development of broadly based media and educational packages could be supported on major issue areas such as: Health-Nutrition-Sanitation; Product Safety; Personnel Interaction with Science and Technological Application; Energy/Conservation; Environment. A balanced presentation of all major participants' views would be provided. Public and commercial television stations would be encouraged to carry the programs. Corresponding educational materials could be developed and distributed nationally; regional distribution could be implemented through the professional societies which could adapt them to state and local needs. Schools could also obtain these packages to assist in local efforts to address these issues.

(3) Experimental television and radio programs would be designed, specifically aimed at encouraging viewer participation in live programs. A possible format would be to have public officials and persons with scientific and technical expertise both within and outside government discuss specific issues. The viewing or listening audience could call in or write in their views.

(4) Development, compilation, and dissemination of special printed materials would be undertaken, using governmental and non-governmental materials. These could include case studies on a spectrum of policy issues; listing or abstracts of pertinent literature and research; listing of relevant resources and sources of information and technical assistance.

State-based Centers to Support Public Programs in Science and Technology

Utilizing the model of the State-based program of the National Endowment for the Humanities, ad hoc volunteer committees in each state made up of scientists and engineers, institutional administrators, and members of the public, could be established. The committees would receive a grant from NSF which they would re-grant to support projects and certain individuals. They would support projects involving public policy issues with scientific and technological concerns proposed by state and local organizations and institutions. Examples are: forums, workshops, media programs, films and other audio-visual aids. Among the policy guidelines under which committees would operate projects would be that of ensuring that a balance of viewpoints be maintained in public presentations and that the projects themselves not be of an advocacy nature.

Centers could also develop and maintain state and local registries of scientists and engineers interested in working with citizens public interest groups, state legislatures and others. Support to individuals could be given through short term associate grants to scientists and engineers, internship programs for undergraduate and graduate science and engineering students, and selectively to professionals identified through the registries for independent research and analysis or for assistance to state and local decision makers or public interest groups. No direct financial assistance is envisioned to public interest groups in this report, however, assistance in the form of supplying services of scientists and engineers could be supported.

Scientists and Engineers Associates Program

NSF could sponsor a national competition to provide one to two year grants to scientists and engineers to pursue work on public policy issues. Participants would be chosen on the basis of technical competence, ability to formulate a problem, and to present conclusions that raise the level of debate on important policy issues. Once selected, they would be free to choose their place of work in the following types of organizations: non-profit citizens public interest groups; regional, state and local governmental agencies or units, such as state legislatures; or media organizations. The grants would cover salaries and some expenses.

Two variations of this option are: 1) a short-term program of three months, implemented either through a national competition or the state-based centers option described above; 2) a separate associates program for work in media organizations, through a competition on a national or state basis for either one to two years or for shorter term projects.

Internship Program for Science and Engineering Undergraduate and Graduate Students

NSF could support programs in colleges and universities to provide undergraduate and graduate science and engineering students an opportunity to work with nearby decision making organizations, nonprofit citizens public interest groups and others as part of their academic training. The program would assist in placing students for part-time work on related public policy issues; offer lectures, guest speakers and seminars on government and public affairs and communications; and public papers resulting from the students' internship work. The program might also involve students from communications

and journalism schools in training and educational programs aimed at improving their understanding of scientific and technological concerns.

This program might also be offered on a short-term basis during the summer. Support could come either from NSF directly or through the State-based Centers described above.

Establishment of a National Clearinghouse with Regional Branches

A national clearinghouse could be established to serve as a central repository of selected materials from NSF, other Federal agencies, and organizations outside the Federal Government which generate research and other information related to public policy issues involving scientific and technological concerns. The clearinghouse would facilitate access to other existing information resources, and provide active and "anticipatory" dissemination services aimed at more effective use of existing materials by members of the public and citizens organizations. Regional branches could also be established.

Establishment of Regional Centers

NSF could support the establishment of regional resource centers. Two program models might be considered.

1) Regional Science Service Centers to serve as information clearinghouses which would collect, generate and disseminate materials on relevant issues and problem areas. Centers could provide individuals and groups with technical assistance and referral services. They would also sponsor workshops and forums on local and regional issues as well as national or global concerns. These centers could also serve as the regional branches of the national clearinghouse described above.

2) Regional Issues Centers, established on a geographical basis, that could undertake focused research on public policy issues of specific regional concern, such as offshore oil drilling or plant siting and disseminate results. Centers would bring together scientists and engineers, citizens and public policymakers for research projects, workshops and conferences, and could maintain an information and dissemination clearinghouse on regional issues.

Forums, Conferences, and Workshops

NSF could sponsor forums, conferences and workshops on public policy issues involving significant scientific and technological concerns. They would focus on global, national and regional/local problems. This option would be implemented by utilizing a combination of program techniques, including:

- Funding forums and conferences at the national level focused on national and/or global problems.
- Funding forums and conferences at the regional level focused on national/global and regional/local problems.
- Funding national workshops involving scientists and engineers from within and outside the Federal Government concerned with the state-of-the-art with respect to specific policy issues or problem areas, e.g., carcinogenic health hazards, nuclear safety, solar energy and alternative energy sources.
- Funding workshop opportunities for Federal policy makers and program implementors, and scientists and engineers from within and outside the Federal Government, as well as concerned individuals, and those

from citizens groups, professional associations, and industry, to have a dialogue on specific topics and to address matters involving resolution of policy issues and the solution of societal problems.

Grants to Independent Journals

Grants could be made to national organizations with journals reaching scientists and engineers, as well as those directed to policymakers and administrators, to support publication of research work. Support could also be given to commission and/or publish reports or papers generated by public interest activities of the scientific and technical professional societies. These grants could be given on a national basis or through the re-granting mechanism of State-based Centers described above.

THE PUBLIC PARTICIPATION PROCESS

Over 1,400 persons contributed to the planning process. The statements made at the public hearings, by mail or on registration forms are the basis on which the needs underlying the proposed programmatic options were developed. Public participation in the planning of the Science for Citizens Program was achieved in two ways.

- A series of public meetings was held in science and technology museums in seven cities during December, 1975. The meeting sites were: Chicago, Illinois; Atlanta, Georgia; Dallas, Texas; Denver, Colorado; San Francisco, California; Washington, D. C. and Boston, Massachusetts. Statements were presented to a panel of NSF personnel and members of the National Science Board. General audience discussion was a feature of both afternoon and evening sessions.

• A notice was placed in the Federal Register on October 31, 1975, and a letter including the Federal Register notice was sent to some 24,600 individuals and organizations on November 4th. These notifications provided information about the public meetings and invited statements to be submitted by mail for those who were unable to present their views in person. It was announced that all statements received would be included in this report to the Congress.

Submissions were made by: persons from education institutions; by concerned citizens; public interest groups; public officials; private citizens; persons from business, industry, labor, consulting firms; directors, staff or volunteers in science museums and centers; representatives of professional societies; and persons from media related occupations. They offered extremely diverse interpretations of the program's purpose, the issues it might address, the types of needs which should be met and the resources to be provided for meeting those needs.

OTHER PROGRAM CONSIDERATIONS

In the SFC planning process, program suggestions related to other activities of NSF were made. The report describes these NSF programs, as well as related efforts by other Federal agencies.

Based on public statements made on Capitol Hill and by participants in the public meetings, criticisms of the program can be expected on the ground that it might give scientists, engineers, and technologists an unusually

strong voice in the formulation of public policy. While this is not the intent of the program, great care must be exercised to insure that different "publics" and industry receive fair treatment and are given an opportunity to state their position in any forum, television program, or other activity that might be sponsored with Science for Citizens funds.

Certain basic standards must be adopted to guarantee balanced participation, and criteria must be established to assure that scientists and engineers and other groups benefiting from the program are not placed in a favored or dominant group position with respect to their influence on public policy formulation.

The means for accomplishing this requirement for the program are unclear, and in fact it might be difficult to satisfy. NSF would use a cautious approach employing pilot and feasibility projects to test the validity of various alternatives. Appropriate measures would be taken to insure that evaluations are made to provide a sound data base for implementing, continuing or for terminating a project or program as experience dictates.

Significant Options Not Proposed by NSF

Program options not proposed by NSF but discussed in the report are: direct funding of public interest groups, an advocacy role for NSF, and no establishment of an SFC program.

Correspondence echoed the concerns expressed at the public meetings that there is an inherent imbalance between the resources of government and industry and those of citizens public interest groups and community organizations to effectively further their aims and press for legislative change. These groups felt that direct funding would provide them with access to the knowledge, information and capabilities required to more directly address the varied issues of concern and contribute to establishment of relevant policy. It was stressed that in recent years many of the traditional sources of funding had virtually dried up and that it appeared that government funding was the alternative to maintaining the ability of these groups to participate as equals in the resolution of public issues. NSF recognizes the concerns of these groups but does not believe that the Foundation is the appropriate organization to determine what consitutes "balance" among the various viewpoints on the many issues a program such as SFC might address.

The Foundation attitude is in no way meant to be negative and NSF acknowledges that citizen groups have a significant role to play in resolution of issues. The Boasberg report (Appendix) suggests key leverage points offering citizens groups the best opportunity for influencing decision making. It also points out that in an increasing number of cases such groups may seek and receive assistance directly from the state or Federal agency responsible for resolution of issues.

NSF capabilities and authorities lie in the support of scientific and technical research. It is the Foundation's view that direct funding could potentially place NSF in an advocacy position beyond its mandate and inappropriate to its mission. It is further suggested that relatively few citizen groups have the resources necessary to administer Federal funds.

NSF believes that many of the options presented will benefit citizens interest groups with a broad range of resources, services and activities, in particular those of the Regional Resources Center and State based centers.

Many suggestions also centered on provision of NSF support through the SFC program for continuing education and for subsidization of special course studies. NSF believes that existing programs are appropriate for educational undertakings of this nature, but that through the SFC program, should it be established, broader access to the existing mechanisms might be achieved.

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INTRODUCTION

The 1976 NSF Authorization Act included the mandate that the Foundation prepare a comprehensive plan for a "Science for Citizens" Program to be presented to the House Committee on Science and Technology and the Senate Committee on Labor and Public Welfare.

NSF has completed this program plan and it is presented in two volumes: Volume I contains Science for Citizens program options, an analysis of the information submitted by interested individuals and groups on which the program options were based, and a review of the public participation process undertaken by NSF in planning the program. Appended to Volume I are summaries of public meetings and correspondence received during the program planning process. Volume II, Appendix, contains the materials submitted by the public, transcripts of seven regional meetings, a specially commissioned report "Provision of Federal Assistance to Non-profit Citizen Groups Dealing with Scientific and Technical Aspects of Public Policy Issues", and other related materials.

To provide a broader base on which to develop the program plan, NSF contracted for the above cited report to review and analyze the implications of Federal assistance to non-profit citizens groups for the purpose of acquiring scientific and technical expertise. It was prepared by the law firm of Boasberg, Hewes, Finkelstein and Klores and is referred to in the body of this document as the Boasberg report.

The purpose of this NSF report is not to recommend the form to be taken by a Science for Citizens program, but rather to suggest options for its conduct and content that appear viable and respond to the Congressional objectives of the FY 1976 Authorization Act.

The objectives:

- o to improve public understanding of public policy issues involving science and technology
- o to facilitate the participation of experienced scientists and engineers as well as graduate and undergraduate students in public activities, aimed at the resolution of public policy issues having significant scientific and technical aspects; and
- o to enable non-profit citizens public interest groups to acquire necessary technical expertise to assist them in dealing with the scientific and technical aspects of public policy issues.

The conference report on the Authorization Act further directed that:

> "This plan is to be prepared with full public participation including: concerned citizen groups; educational institutions; scientific societies; individuals and groups with expertise, experience or interest in improving scientific and technical information; and individuals and groups with expertise, experience or interest in improving the participation of scientists in public policy debates."

Public participation in the planning of the Science for Citizens Program was achieved by holding a series of public meetings in science and technology centers in seven cities during December, 1975, and by soliciting participation in a notice placed in the Federal Register of October 31, 1975. Additionally, a letter including the Federal Register notice was sent to some 24,600 individuals and organizations and 5,431 press releases were issued. These provided information about the public meetings and directions for submitting statements by mail. It was

announced that all statements received by January 10 would be included as part of the recorded submitted to the Congress.

Over 1400 individuals and organizations responded to the NSF request. Their views and the program options based on those views form the body of this report.

I. THE PUBLIC'S VIEW OF THE SCIENCE FOR CITIZENS PROGRAM

Over 1,400 persons contributed to the planning process. The statements made at the public hearings, by mail or on registration forms are the basis on which the programmatic options for the Science for Citizens Program described in this report were developed.

Those who submitted statements as individuals or as representatives of organizations spanned broad segments of society. In descending order of prevalence, they were:

- Persons from educational institutions, a very small fraction of whom identified themselves as students.
- Members of citizens or public interest groups, including several representatives of religious organizations and around 50 who wished to protest NSF involvement in the development and implementation of social science curricula.
- Public officials; spokesmen from local and state government, regional and federal agencies, commissions, etc.
- Private citizens, some of whom identified themselves as scientists or engineers.
- Persons from business, industry, consulting firms and labor organizations.
- Directors, staff, or volunteers from science museums or centers

and from libraries.

- Persons representing professional societies including those focusing on social, scientific, applied science, and medical societies.
- Persons from media related occupations.

An exact count was not possible because it was not always clear if an individual's views were given as a private citizen or as a representative of a larger body.

The Diversity of Suggestions Submitted

A diversity of viewpoints is readily apparent in the summaries of hearings and selected correspondence and statements appended to this report. The magnitude of the response and the wealth and diversity of ideas and viewpoints expressed made it impractical to take a strictly quantitative analytical approach in the preparation of this report. Differing opinions were expressed on policy issues or problems to be addressed; on the overall purpose of the program; and on the audience, clientele or constitutency to be served. It was felt that any attempt to present quantifiable generalizations could lead to gross over-simplification and possible misrepresentation. Therefore, a qualitative approach to synthesizing and analyzing the material has been adopted. An effort has been made, where particularly noteworthy, to cite the relative incidence with which certain ideas occurred.

Contributors to the SFC plan have not only interpreted the three program objectives in differing ways, but they have defined or interpreted key terms in the objectives, as well as the purpose of the program, differently. The perceived needs the program should address and the means to meet them also varied.

Interpretation of Key Phrases and Terms

Looking first at the different interpretation of key terms and phrases in the stated objectives one finds: "Science" was interpreted by some as being synonymous with knowledge (also variously defined); by others as being restricted to the physical sciences, or as meaning technology.

Differing views surfaced on whether "science" included the social sciences. A number of persons explicitly stated that the social sciences should be excluded from NSF programs. These individuals generally equated the term "social science" with behavior modification and personality control or manipulation. They adamantly opposed the use of public funds for activities designed to alter attitudes and behavior.

Some individuals included or stressed the application of the physical or social sciences or interdisciplinary approaches involving both; a variant being the application of purely technical knowledge. Some of them saw science as encompassing a concern for planning and administration, and management and coordination of organizational arrangements and change. Others stressed techniques for effecting technology transfer, information

dissemination, innovation diffusion, and knowledge utilization. Also included or stressed were communications and media. Others included technology assessment and long range forecasting techniques.

Just as interpretations of "science" varied, so did interpretations of the lengthy phrase "public policy issues having significant scientific and technological aspects." This phrase was viewed by some to mean public policy issues that involved policy options with scientific or technological content, this typically involving the understanding and/or possible application of the "hard" sciences. Others interpreted the same phrase as referring to issues involving the application of the "hard" and "soft" social sciences. A significant number of persons expressed strongest interest in social scientific concerns. A few applied this phrase to the adoption of the metric system or the impact of mini-computers.

Some read the words to mean "all public policy issues" and felt that the formulation of policies and the solution of complex societal problems required a cross disciplinary approach and application of a range of scientific techniques. Others read the words as meaning any given public policy issue, in that the solving of complex societal problems was seen as involving reasoning and knowledge along with understanding and valuing. One concern expressed was that man was in danger of becoming an object of his own technology; that scientific and technological advancement should not be seen as an end in itself but should rather be in the service of human values, contributing to human welfare and to the enhancement of the quality of life.

Views Concerning the Purpose of the Program

The purpose or mission of the program was interpreted in various ways. The program was seen as an instrument to accomplish different but not necessarily uncomplementary ends. Among these were:

1) assuring that those outside federal agencies have access to resources and/or opportunities that allow input and participation in the policy formulation process. This is seen by many as a means of redressing what is perceived as a current imbalance of resources between citizens interest groups and individuals on the one hand, and industry and government on the other

2) opening a clear channel of communication from NSF and other Federal agencies to those outside government to allow access to government-generated research and other resources pertinent to resolving public policy issues. Many saw the latter as being essential to informed decision making and policy formulation

3) providing for an ongoing and productive public debate on scientific issues

4) providing for basic or continuing educational programs designed to enhance understanding of science and technology (as variously interpreted) relevant societal problems and/or issues

5) providing for an ongoing and productive dialogue between those at NSF or other Federal agencies and those outside the federal government structure

6) focusing on the concerns of women, minorities, the elderly and the poor and on career development and mobility programs for women and minorities.

Participants in the Program, Beneficiaries, and Clientele

The major participants and/or the program's clientele or major direct beneficiaries are listed below and were seen as: 1) interfacing with scientists and engineers; 2) gaining access to and/or utilizing scientific and technological expertise, information and services; or 3) otherwise participating in or benefitting from the SFC program.

- individual citizens
- the public in general
- the academic community
- students
- citizen action groups, public interest groups
- groups primarily concerned with consumer advocacy
- professional associations and societies
- scientists and engineers
- public officials in legislative roles
- all public officials at all levels of government

- those in the public service generally
- persons in business, industry, and organized labor
- women
- minorities
- senior citizens
- the poor

While strong sentiment was expressed that citizen action groups and public interest groups be made the prime beneficiaries of the program, such sentiment was by no means universal. Assistance to individuals who are not members of these groups, as well as to the public in general, was stressed by many.

It also should be noted that many individuals saw the academic community playing a major if not the major role in the SFC program. Others saw scientists and engineers not necessarily affiliated with academia playing a major role. Some urged that scientists and engineers from industry be included in the program.

Range of Issues, Concerns and Problems Mentioned

Suggested targets for the program ranged from local or regional concerns to national and global concerns. The list that follows reflects the varied character of the concerns suggested.

- food scarcity
- food production and distribution
- population

- natural resources, renewable and non-renewable
- oil shale; off-shore drilling
- oceans
- energy; alternative sources, conservation
- resource recycling and resource recovery
- environment and ecology
- environmental pollution
- environmental impact statements
- land use
- power plant siting
- local issues such as the channelization of a river
- auto emissions
- sulphur emissions
- B-1 bomber, the Concorde, and the SST
- destruction of the ozone layer
- solid waste management
- hazardous waste disposal
- nuclear power and nuclear safety
- nuclear weapons
- social and economic impacts
- education
- training

- health care
- addiction related concerns
- handicaps
- alienation
- food and drug safety
- biomedical concerns including genetic experimentation
- consumer rights and concerns
- civil liberties and freedoms including freedom from government intervention in areas involving personal values and freedom from manipulation and behavior modification techniques
- crime
- the economy and unemployment
- housing
- concerns of women, minorities, the elderly, and the poor
- minority concerns including programs in the scientific fields for women and minorities, career development and mobility
- the quality of life
- the use of "appropriate" or "intermediate" technology
- the application of research or knowledge
- technology assessment including societal impact of technology
- diffusion of new research results
- communications and media

- basic philosophical questions concerning the impact of science and technology on contemporary civilization
- basic questions of values often at the root of controversies over policies
- practical concerns, such as acquiring skill in using the metric system, meeting code standards in the renovation of houses, learning basics of scientific subjects such as chemistry or developing a basic science literacy.

Differing Views of Resource Needs and Ways of Meeting Them

A wide range of resource needs and suggestions for meeting them were proposed:

Informational and Educational Needs:

Ways to meet needs: Any or all of the following: information repositories; information dissemination services, technical assistance services (including possible assistance in research efforts); referral services, including referral to information sources, to educational and training programs; establishment of related curricula; forums, conferences, and workshops; other related informational and educational activities including those involving electronic and print media.

Human Resource Needs: (the transfer or application of expertise, knowledge, and skills)

Ways to meet needs: provision of expertise or technical assistance, or referral to such expertise and assistance.

Organizational Resource Needs:

Ways to meet needs: Utilize established or develop new organizational mechanisms networks and activities in the public or private sector or in both.

Fiscal Resource Needs:

Ways to meet needs: Direct funding, subsidization, or free provision of services to establish new and operate existing organizational mechanisms that do any or all of the following: foster education and/or training opportunities; sponsor program activities (which could include meetings, forums, conferences, workshops, etc.) provide expertise for research.technical assistance or other purposes or provide referral to such expertise or assistance; provide for compiling, developing and/or disseminating written or electronic media or media mixes.

Suggested Role of NSF in an SFC Program

The role of the NSF was seen as taking different forms. With respect to the question of the organizational character of the program some favored a decentralized program emphasizing a "bottom-up" approach, e.g. direct or indirect funding of public interest groups or others. Others favored a centralized "top-down" approach, e.g. funding for existing NSF projects. Others favored an approach which included a balanced "bottom-up" and "top-down" orientation in which NSF functioned in a leadership role, as well as in the role of catalyst and facilitator. This latter orientation would

allow those spearheading program efforts at the regional, state and local levels to perform the same functions at those levels in concert with national level program efforts.

With respect to other aspects of the nature of NSF's involvement, some saw NSF exercising a leadership role by serving to spotlight major issues and concerns and to commission reports or white papers on them or to otherwise foster debate and resolution of such issues and concerns. NSF was seen by some as an appraiser of issues relating to science or technology, while others saw the Foundation taking advocacy stands. Some persons saw NSF in the role of ombudsman, mediator, or broker, helping to assure a hearing for positions or views counter to or not reflected in national policies or government stands.

NSF Noninvolvement

Sentiment was also expressed by some participants that NSF should not become involved in a Science for Citizens program. Their concerns centered on one or more of the following issues:

- That it would represent Federal interference in the public decision-making process
- The inability of a Washington-based agency to be sensitive to local and regional issues
- Poor use of Federal funds
- The danger of social manipulation, particularly based upon the development of social science curricula and other social science activities.

II. SCIENCE FOR CITIZENS PROGRAM OPTIONS

Based on the public's suggestions, NSF has developed a series of nine program options for the Congress to consider in reviewing the experimental activities proposed by NSF for a Science for Citizens Program.

In drawing up these program options NSF has adopted a flexible approach. Depending upon the resources available, they could be undertaken simultaneously; the emphasis given to any option could vary.

From NSF's perspective, some key points should be stated about these program options. Together these options share three common characteristics:

1) They represent what NSF believes is a responsive approach to the three objectives set forth in the NSF Authorization Act. The options provide a range of services and activities that could benefit citizens, scientists and engineers, and non-profit citizens public interest groups for the purposes stated in the Act.

2) They respond to the testimony given at the public meetings and to statements submitted through correspondence or registration forms. Given the range and diversity of views presented the options could not be all-inclusive. Many suggestions fall outside the scope and authority of NSF legislation; others represent ideas that are better addressed through other Foundation programs. Nonetheless, every attempt has been made to incorporate as many of the suggestions presented that seemed realistic and feasible.

3) They provide for services, resources and activities, all of which could have some immediate impact in addressing the needs of citizens,

scientists and engineers, and non-profit citizens groups. These options also have a potential long-term impact if they are implemented over a period of years.

The nine program options developed by NSF are described in the following section, without priority listing. They are:

- Registries of Scientists and Engineers
- Media Programs to Increase Public Understanding
- State-Based Centers to Support Public Programs in Science and Technology
- Scientists and Engineers Associate Program
- Internship Program for Science and Engineering Undergraduate and Graduate Students
- Establishment of a National Clearinghouse with Regional Branches
- Establishment of Regional Centers
- Forums and Conferences and Workshops
- Grants to Independent Journals

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OPTION: REGISTRIES OF SCIENTISTS AND ENGINEERS

Description of Program Option: NSF could support the compilation of registries of scientists and engineers interested in serving as resource persons to citizen public interest groups and others. The registries would contain information about a person's professional qualifications and experience, availability, and requirements, if any, for remuneration for services.

There are two key reasons for consideration of this option:

- There are at present limited opportunities for individuals to make known their willingness and availability to work with citizen public interest groups and others; the testimony at the public hearings and in correspondence indicates that a registry would be well used if one were established;

- citizen public interest groups and others have difficulty identifying the key resource people needed for their work.

Implementation of this option presents a number of issues for NSF; among these are:

- Scope of registries; national, regional, state, local: If compiled only on a national basis, it might be difficult for local and state oriented groups to utilize the registries. A separate register of persons interested in working with national offices of public interest groups or agencies such as the Legal Services Corporation might be compiled to take care of this problem. Regional registries could be supported; e.g., a list of interested individuals in the New England or Southern states. The compilation of regional registries, however, might be duplicative of state registries and

not as useful. State or local registries offer a more manageable and usable system, and would be responsive to the needs of many groups whose interest focuses on issues of state or local concern. They would also be useful for state legislators and civic leaders. If the Regional Science Service Centers were established (as described in another option), the registries from individual states could be kept together on a regional basis.

- Compilation of registries: NSF could contract with professional societies to send questionnaires to members, as well as utilize registries already compiled. During the SFC planning process, a number of examples of registries were given. Among those cited were: the Science and Technology Advisory Information System of the Biophysical Society; the Clearinghouse project of the Public Interest Economics Foundation; a directory of ecologists compiled by The Institute of Ecology; Professionals in the Public Interest, a local effort in Washington, D. C.; a pilot roster of interested AAAS members in Massachusetts; a directory of the National Association of Utility Commissioners, and Student Environmental Counseling Organization (SECO).

NSF will need to examine these and other registries in order to avoid duplication, and determine the most advantageous means of setting up new ones. Care needs to be taken to design the format for the registries in such a way that they can be readily utilized. Consultation with citizens public interest organizations on this would be both useful and necessary.

• Maintenance of lists: Responsibility for updating lists could be borne by the professional societies or by a separate organization set up to handle this. One possibility for maintenance would be utilization of the State-based centers described elsewhere as an administrative mechanism for maintaining lists and disseminating them to interested organizations.

• Certification: A potential problem is that these registries might be viewed as "government approved" lists. In establishing the program, NSF would clearly state that the registries are open to anyone who wishes to submit his/her name, qualifications and availability. Related to this are the criteria for placing a name on the registry. There is some question whether the lists should be limited to scientists and engineers from the "hard" sciences or include social scientists, lawyers, physicians, and others. If people not in specified disciplines would wish to be included, it might well be a difficult matter to turn them down.

• Assistance in use of the list: Beyond the task of keeping the list up to date and distributing it to libraries, museums and others who request it, consideration must be given to whether an NSF-supported organization should attempt to foster its use, screen requests or act as a "broker" between registrants and organizations. The Biophysical Society and the Public Interest Economics Foundation provide examples of such efforts. This type of assistance was suggested by some at the public meetings as a necessary tool for making such lists readily usable. If no screening or outreach mechanism is supported or encouraged, many groups

may not be able to easily identify an appropriate person for their activities. In addition, some who place their names on the registries will require remuneration for their services, and some assistance may then be needed. In certain instances, this assistance could be provided through the State-based centers discussed elsewhere in this report.

Need for Program Option: Establishment of the registries will be a valuable tool for reaching scientists and engineers who wish to participate in public interest activities but have few opportunities available to make this interest known. Several groups testified that they invariably sought expertise and assistance from those they already knew. Thus, the registry would expand the identified number of experts available.

Mrs. Juanita Ellis of the Citizens Association for Sound Energy, spoke at the Dallas meeting about her group's need for finding expert advice. She said "... it's very difficult unless you just happen to know someone to get this kind of information or find this kind of expertise available... so some sort of listing to us would be very valuable."

The establishment of a registry by the SFC program might also provide an incentive for scientists and engineers to become actively interested in assisting citizens public interest groups. Different views on this possibility were presented. James Kalish of the Eugene and Agnes E. Meyer Foundation stated at the Washington meeting that most scientists would not be inclined to participate in public policy related activities, particularly those involving public interest groups. In contrast, Dr. Gilbert Yanow, President of the Alternate Consumer Energy Society, spoke at the San Francisco meeting of his group of scientists and engineers at the Jet-Propulsion Laboratory who work voluntarily with citizens on energy conservation efforts.

Other suggestions were made that in facilitating scientists' and engineers' participation, not only those in the academic community should be encouraged but people in industry as well. Donald G. Manly, Director, Corporate Research, Air Products and Chemicals, Allentown, Pennsylvania, wrote: "If the goal (of the second SFC objective) is to be truly achieved, then it will be critical that the terms'experienced scientists and engineers' include industrial as well as academic people. Without the participation of the industrial sector and the experience in real world science and technology that this brings, the public understanding developed will be unrealistic and we will have fostered a further polarization of the public." He also suggested establishing a registry of retired scientists and engineers.

To provide assistance fairly early in the SFC program, this option could be started quickly, particularly if the professional societies and public interest organizations were utilized to compile lists from their members. NSF could begin to make these registries available in selected libraries and science and technology museums, state legislatures, and, if implemented, the pilot State-based centers. Mailings to organizations alerting them to the registries could also take place.

Potential Problems: NSF does not see any major disadvantages to this option if the format of the registries is carefully designed to provide meaningful information to potential users, and if registries can be widely located in appropriate settings.

Mention has already been made of the views presented that if a registry is established without any outreach or facilitation mechanism it might not be as successful a program. For those groups who have already identified scientists and engineers with whom they wish to work, the registry may not

be as useful as it would to others who have up to now been unaware of a potential range of people willing to work with them. Maintenance of lists could be very costly and difficult.

Timing and Implementation: Work on the compilation of lists and preparation of the registry format could be started in the program's first year. Registries in a few fields could be compiled initially to start off the program, and dissemination begun. If existing registries are used and some new ones compiled, costs of this pilot effort are estimated to be between $150,000 - $200,000.

OPTION: MEDIA PROGRAMS TO INCREASE PUBLIC UNDERSTANDING

Description of Program Option: NSF would support various types of media programs specific to the Science for Citizens program. The importance of the media in ensuring achievement of the SFC program's objectives was brought out in all of the public meetings and in the correspondence. The use of all media forms was proposed, with particular stress on the ability of television to communicate to the greatest numbers of people. Many of the participants suggested that innovative approaches combining different media techniques or a means of facilitating actual public participation in a media presentation setting, would be very beneficial.

In designing a media program it would be important for the SFC program to closely collaborate with NSF's ongoing activities in the Office of Public Understanding of Science Program (OPUS). The purpose of the OPUS program is to provide the public with an understanding of the role of science and technology in modern society; the options it makes available; and with general scientific and technological information and skills relevant to public policy issues as well as to the personal welfare and interests of citizens. A number of its projects have been targeted to special audiences, such as minorities, rural populations, senior citizens and union members. Projects undertaken are: film and television projects; museum programs, seminars and public forums; science journalism; research on information needs and effectiveness of alternative modes of communication.

Project awards by OPUS have focused on the communication of both the basic and applied elements of the physical, life and social sciences. The program

has funded the "NOVA" series; a film on the earth's magnetosphere; special educational seminars on social science research methods for reporters and editors; and a public education program in the marine sciences at the New Jersey Wetlands Institute. Thus, in addition to supporting more public understanding of basic sciences, the program has supported efforts related to the SFC mandate. Careful consideration would have to be given to avoiding duplication of efforts between the two programs and to collaborati as appropriate.

NSF could utilize the SFC program to develop creative media programs aimed at public understanding of public policy issues which have scientific and technical aspects. Some examples of the types of programs that could be funded are as follows:

- A Television Series Based on The "Advocates" Approach: The "Advocates" format could be focused on pertinent public policy issues, such as the environment or energy, or raise fundamental questions concerning science or the role of science and technology in improving the quality of life and promoting human welfare. Such a series could involve scientists, engineers, public officials, public policy makers, spokespersons from citizens advocate groups, etc. A balanced presentation would be a prerequisite for such a program with appropriate representation by industry, local organizations and public interest groups. A follow-up to the program could include polling, call-ins, letter writing, requests for specially developed materials, lists, or already existent information and materials. These programs could also be repackaged and distributed to libraries, science centers and museums, and schools as the basis for further public discussion.

Needs Addressed: The funding of such a media series would respond to the educational needs of the public. It would do so by serving to clarify the values, facts, assumptions, and points of view underlying differing sides of controversial issues. It would thereby contribute as well to the potential resolution of policy issues. These directional needs and the needs for opportunities for persons holding differing points of view in a public debate or forum were expressed by numerous persons.

Dr. Truman O. Woodruff, Professor of Physics at the Michigan State University, addressed these needs in his remarks at the Chicago hearings. He talked about the need for airing differences in a debate format, either filming or televising it, a concept which would be much like public television's "Advocates" series. He also suggested that scientific staff be provided to those taking part in the debate. The same common background would be given to the "Advocates" and the viewing audience; the course of the debate and discussion to follow would reveal the nature of the differences in interpretation of the same background material.

"The Advocates" is a well known program and has established a wide viewership. Because of the proven popularity of this program, one following a similar format might be expected to attract a large and interested audience. As a result of such programs the public would be better informed concerning public policy issues and would have greater understanding of the viewpoints, value judgments, and assumptions involved.

Potential Problems: There may be difficulties in finding skilled moderators who would be available to work in the production of the series. There also are some potential problems in choosing and handling the policy issues to be discussed, as well as assuring balance.

Some people can be expected to regard some controversial issues discussed on such programs as inappropriate subjects for Federally supported media programs. Opposition from such persons can be expected. For this reason as wide a participation as possible should be provided for in the review of the process or content of the programs as appropriate. Audience participation in the actual programs would also be a means of meeting anticipated objections.

The question of balance would also have to be considered. At the Dallas hearings, Dr. Sandra Myres, a teacher, formerly the Director of the Texas Committee for Humanities and Public Policy in Arlington, cited problems encountered in the NEH program in trying to assure that every point of view is presented on a controversial topic. Allowance for statements and questions from a live audience can assure that viewpoints other than those expressed by the panel of advocates and experts are heard. Inclusion of an audience participation feature might lessen the objection to the program by persons taking stands which are at odds with most, if not all of the panel of advocates and experts.

Implementation and Timing: This program series modelled after "The Advocates" could be implemented by awarding a contract to qualified applicants with close oversight exercised by the SFC program and NSF. First year funding in the amount of $150,000 could be provided to launch the pilot series.

• Develop Broadly Based Media and Educational Packages: NSF could support the production of a series of television programs focusing on how science relates to policy issues. The 1975 Annual Report of Advisory Committee for Science Education identified five developmental areas pertaining to the SFC program on which these educational packages could be structured. The areas are: Health-Nutrition-Sanitation; Product Safety; Personal

Interaction with Science and Technological Application; Energy/Conservation; Environment. A balanced presentation of all major participants' concerns about an issue would be required. These television programs could be shown on educational and commercial stations.

As a component of the program package, corresponding educational materials could be developed, an approach recommended by the Advisory Committee in its 1976 report. These could be distributed nationally through PBS or the national/regional clearinghouse(s) described elsewhere in this report. They could also be distributed locally through schools or through regional offices of professional societies which could adapt them to state and local needs. The educational packages would also be used to respond to requests for materials generated by the "Advocates" approach described above.

In consideration of this option, NSF has the precedent of other television programs on public or scientific concerns which have been well received or obtained much publicity from favorable reviews. Among these are the NSF-sponsored "NOVA" series; the National Geographic Society's "The Incredible Machine", the WNET Bill Moyers' Journal program on "The Troubled Seas", and the "Ascent of Man" series developed by Jacob Bronowski. Development of educational materials to accompany similar series would provide an added dimension.

Needs Addressed: This program package could contribute positively to the public's understanding of major issues and meet the expressed need for more significant television programming on the relationship of science to public policy issues. With a follow-up offering more information, an effective mechanism for furthering knowledge will have been provided.

The kind of follow-up which might result from such a series can be illustrated by a project described at the Boston meeting by Suzanne Gray, Coordinator for Science, Boston Public Library. Sponsored by AAAS and the Library, a film discussion series, "The Best of NOVA", showed selected science films dealing with public policy issues involving science and technology, and recent developments in pure science. A scientist was an invited discussion leader at each showing, and his comments have been videotaped. Ms. Gray suggested that the tapes and informational material made available for the discussion could be packaged together and then made available to smaller libraries. Materials received on the "Contemporary California Issues" project multimedia curriculum on public policy issues, offer another example of the form such a project could take.

Potential Problems of Program Option: If pre-program publicity is not well done, the effectiveness of the effort may be minimal. Wide distribution and usage of the educational materials may also be a difficult task, particularly the problem of reaching new audiences. As with other such media efforts, SFC participants stated that it is important they be designed in such a way that they attract a new type of viewing public.

Timing and Implementation: The program could be implemented through an NSF award of a contract to a qualified applicant. Consideration might also be given to having an advisory council review the preparation of materials. Consultation with other Federal agencies, such as EPA, ERDA and FEA would also be necessary as the program got underway. Depending upon proposals received, an initial budget of $150,000 might be appropriate.

Experimental Television and Radio Programs: NSF could support a program series aimed at encouraging viewer participation in live television and radio programs. A possible format to consider is to have public officials and persons with scientific and technical expertise from within and outside Federal, state, or local government on a live television or radio panel to discuss specific issues. The viewing or listening audience could call in or write in their views on the issues discussed and could ask questions. Materials could also be requested and supplied as described above. A similar effort has been underway on National Public Radio in conjunction with the Bicentennial.

Need for Program Option: For those participating in the SFC planning process, who expressed frustation in making their views on issues heard, this approach would offer a potential means of alleviating some of these frustrations. The SFC program was encouraged to support this type of approach. For example, some suggested setting up toll free telephone numbers so that citizens could talk to experts after a television series on an issue was aired, using interactive 2-way cable television or other techniques. In addition, by including both public officials and scientists and technological experts on these programs, greater responsiveness and understanding of the political and social ramifications of scientific and technological decisions could be generated.

Potential Problems: It has been suggested that such programs may not provide enough in-depth opportunities for discussion of topics. The program design should be carefully drawn with this potential problem in mind and some type of outside evaluation built in.

Timing and Implementation: Because this type of program series would not be difficult to launch, a few efforts might be tried in a region on a pilot basis during the first year of the [illegible] program. A program with national coverage could also be tried, possibly in conjuction with the Public Broadcasting Service and/or the regional public television networks. The anticipated budget for a pilot effort would be $25,000.

Development, Compilation and Dissemination of Special Printed Materials.

Printed materials could be developed where needed and compiled where already available. These could include a compilation of case studies and relevant research and informational materials covering a spectrum of issues and problem areas; listing or abstracts of pertinent literature and research; listing of relevant resources and sources of information, technical assistance and expertise. This compilation could include Federal as well as non-Federal materials. Existing materials designed to communicate to persons with extensive technical training could be "translated" for those having less, little, or no expertise. Special materials could be developed for public administrators, public officials, and persons actively concerned with policy issue resolution and societal problem solving. Such material could address the legal, administrative philosophical and practical as well as technical and scientific concerns. The materials developed could be disseminated through the national clearinghouse or its branches, as described elsewhere in the program options.

Needs Addressed: The development, compilation and dissemination of special printed materials would be a means of assuring the best and widest possible use of research, information and resources which already exist. The development and compilation of such materials and their broad dissemination would contribute to advancing understanding of basic issues in every major policy and problem area.

The needs expressed by many SFC participants for accessibility to materials already in existence is cited extensively in the program options concerned with the establishment of a national clearinghouse with regional branches and with the establishment of regional science service centers that would house the regional clearinghouses. Many of the individuals focused on the effective coexistence of a wealth of available materials and research. Other ideas for such a program included case histories, detailing cases involving the actual solving of problems and resolving of policy issues, as suggested in a statement received from Lynton Caldwell, Professor of Political Science at Indiana State University and by Dr. Susan Hadden of the Southern Center for Studies in Public Policy at the Atlanta meeting. Reference materials or abstracts similar to the materials found in the "Contemporary California Issues" series, developed by Bernard J. Luskin, Vice Chancellor, Educational Planning and Development, Coast Community College District, Costa Mesa, California.

The development, compilation and dissemination of special printed materials would respond to a range of needs expressed, including the need to provide resources to which citizens could turn for reliable objective information on controversial issues. Carolyn S. Konheim, Executive Director, New York Scientists Committee for Public Information Inc., noted this need in describing the objectives of the organization with which she is affiliated.

The need for materials to be "translated" was cited by numerous individuals. Sister Ann Neale, Director, Bishops Committee for Human Values of the National Conference of Catholic Bishops, Washington, D.C., wrote of the need of simplying and/or summarizing high powered scientific studies for more general consumption. She recommended that the SFC program initiate and fund the translation of already accomplished research into educational programs for the lay public. Sister Neale also urged that educational and informational materials include an emphasis on ethical questions.

Rob Strauss at the Dallas hearings underscored the importance of developing materials that the layman can understand, and Mr. Gene Freeland with the Dallas AFL/CIO similarly stressed the need for scientists to communicate with the average citizen "in terms that can be understood".

Materials such as those described by David W. Kean, Executive Director, Techno/Culture Institute, Sunnyvale, California, could also be developed. Mr. Kean recommended the use of a communications tool which the Techno/Culture Institute calls "Confrontations in Print." That is described as being essentially a debate in printed form. It is not, however, a transcript of an oral debate. The role of the moderator is greatly magnified, and can be seen as "surrogate for the lay reader." The moderator's summary provides in tabular form the principal facts on which the advocates agree and those on which they disagree. The value judgments that each advocate applies are also analyzed. Two subjects discussed in connection with this approach were the California Nuclear Initiative and the world food problem.

Materials based on a similar kind of format could also be developed and distributed in conjuction with the "Advocates" or other type of media series along with reference lists of books and sources of information, etc.

Potential Problems: Considerable expertise is needed in developing and compiling written materials for readers with differing levels of comprehension. If the materials developed are not of the highest possible quality and widest appeal, they will not be noticed, sought or used. If an active dissemination effort is not undertaken, such materials are not likely to attract attention or be used.

Materials developed or compiled for the lay public must be done with care so that they are readily understood. A suggestion was made by Dr. Werner Schultz of the biochemistry faculty at the Hockaday School in Dallas that the scientific and technical content of such materials might be developed by high school teachers who have developed skills in simplifying and communicating scientific subject matter to their students.

Great care also needs to be taken in developing and compiling materials with other than lay audiences in mind. Materials would be developed for those who are deeply involved in matters involving the formation of public policy or the resolution of policy issues. Equal care needs to be taken in developing such materials if they are to prove useful to their intended readership.

Implementation and Timing: This activity could provide for the development, compilation, and dissemination of a wide range of materials. First year

funding levels for this activity would depend largely upon the universe of existing materials that could be identified and compiled. A search would be instituted to identify this universe as well as other searches which have to be conducted or are now in progress. Fifty thousand dollars could be spent on an intensive short-term search to be completed within the first six months of the program. Development of basic materials for dissemination could be begun during the first year of the program.

Dissemination efforts could be carried out by the National SFC office, the National Clearinghouse, the regional branches and centers, or any of a number of other channels. One hundred thirty thousand dollars would be the first year funding level for development, compilation, and dissemination of such materials. These funds would also be spent on materials to be developed in conjunction with the television programs or films that would be produced under other sections of this media option. Abstractions, compilation of existing materials and development of lists of materials and resources, sources of information, etc. could be undertaken in conjunction with the National Referral Center and with other Federal as well as non-governmental agencies and organizations engaged in similar efforts. The development and compilation of such materials would be begun as soon as the review of the universe of existing materials and resources was completed, no later than six months after the time the program becomes operational.

Approximately half of the monies spent in developing, compiling and disseminating material would be spent on materials developed for the lay public and others with no scientific or technical expertise. The rest of the monies would be spent on materials developed for a range of other groups and individuals having varying kinds of interest and expertise. Total first year funding for activities relating to the development,

compilation and dissemination of special materials would be $180,000.

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OPTION: STATE-BASED CENTERS TO SUPPORT PUBLIC PROGRAMS IN SCIENCE AND TECHNOLOGY

Description of Program Option:

NSF proposes to establish State-based centers to support public programs in science and technology. The model for this Program is the State-based Program of the National Endowment for the Humanities (NEH), in operation since 1970. The purpose of the NEH program is to increase the role of the humanities in contributing to citizen understanding of current public issues. This program thus serves as an appropriate model for NSF to use in a program aimed at illuminating issues involving scientific and technological concerns.

Projects which these centers could support include:

- Forums, workshops, conferences on public policy issues of local or state concern
- Media and telecommunications activities
- Newsletters, journals, preparation of special case studies on issues; films and other visual aids for displays in libraries, museums, community centers.

Individuals could also receive support for work with public interest groups, and other organizations such as state legislatures and the media. These centers would serve as administrative and fiscal mechanisms for three program options described elsewhere in this report. These activities would involve:

- Short-term grants for science and engineering associates

- Short-term internships for undergraduate and graduate science and engineering students

- Assistance for scientists and engineers identified through registries who might otherwise not be able to undertake particular tasks.

Utilizing the NEH model, an ad hoc volunteer committee in each state would be responsible for program operation. This committee could be made up of roughly equal numbers of scientists and engineers, members of the public, and institutional administrators (university presidents, directors of museums of science and technology, etc.). Committee size would range between 18-26 members.

These committees would receive a basic administrative and program development grant (NEH provides $40,000). In addition, they would receive a bloc grant of funds which they would then regrant. Recipients of regranted funds would be (1) organizations, groups and institutions who propose projects to committees pertaining to the scientific and technological aspects of public policy issues, and (2) individuals seeking short-term internships or associate grants, or scientists and engineers identified through the registries who are in need of financial assistance for particular tasks. The smallest current NEH bloc grant for projects is $121,000; the largest, $460,000. (This NEH program does not fund individuals.)

It would have to be decided whether NSF's program should have a matching requirement for regranted funds given to state committees, as the NEH

program does. This matching requirement could be in dollars, or in-kind services, such as use of facilities, materials and reproduction services, partial payment of travel funds for conference/workshop participants, or lower stipends to speakers. Because the matching requirement for NEH grants is based on the total amount which an ad hoc committee receives each year, the matching amount on projects varies. Often certain participants can and do provide more than 50% in their combination of in-kind or monetary contribution.

The policy guidelines governing these committees could closely follow the NEH model where very broad guidelines are set for the program and each state is allowed the opportunity to design its own program. Final responsibility for determining all grants would rest with the committee in each state in order to maintain the state and local character of all funds given.

Using this approach, the basic framework for NSF grants to committees would include the following for support of projects:

- All grants of a state committee should support projects on public policy issues involving science and technology which affect a broad spectrum of the public

- Projects should provide ample opportunity for diverse points of view to be expressed. A balance in the presentation of viewpoints in forums, printed materials and communications programs must be maintained. Projects cannot be of an advocacy nature, nor action-oriented, i.e., designed in such a way that they lead audiences to take specific actions

such as lobbying on behalf of a cause or working to create sponsorship for a piece of legislation. Individual adversary viewpoints may be expressed but the overall project must remain balanced.

- Projects should involve the adult, out-of-school public.

The criteria which State-based committees would use for selecting qualified individuals under the scientist and engineering associates program and the student internship program are described elsewhere in the options section. The committees could provide this type of support for short periods of one to three months. Additionally, as part of their activities in developing and maintaining registries of scientists and engineers interested in working with citizen public interest groups, the centers would no doubt identify professionals who are unable to perform such work without some form of remuneration.

In determining support for individuals, the committees could also utilize an additional criterion with respect to the organizations receiving the services of these individuals. Criteria of need could be applied so that underrepresented points of view can be neard in procedures established for the resolution of policy issues.

If this option were implemented, and a number of centers operating, NSF would want to consider developing a network mechanism to share information among centers as well as maintain linkages with the national clearinghouse. This mechanism could include a systematized information-sharing program, and regional or national conferences in which committee members and grant recipients could participate.

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Needs Addressed: NSF views these state-based centers as a viable means of addressing the needs of local and state organizations for grant support of public policy activities. These centers offer an alternative way of meeting the need for direct funding cited by citizen public interest groups. Testimony at SFC meetings strongly favored the establishment of some kind of mechanism which would be responsive to needs identified with state and local levels, and one which would raise the level of public understanding on particular public policy issues. The ability of the state-based centers to accomplish this end was cited at the Boston meeting by Dr. Nathaniel Reed, Executive Director of the Massachusetts Foundation for Humanities and Public Policy:

> "The Foundation members and . are convinced that the Endowment's method of supporting humanities projects aimed at the general public by utilizing independent state committees has worked successfully. Since community groups must take the initiative in requesting a grant, it allows local determination of what are the important issues and how best to promote public discussion of them.
>
> "Disbursement of the funds by a committee attuned to state affairs insures that a variety of important issues will be addressed and that all regions will be served."

Each of the State-based committees would establish its own operating guidelines, its requirements for grant applications, deadlines for submission and procedures for evaluation and fiscal reporting. This flexibility

would appropriately allow each to tailor application forms and reporting requirements so that some of the complicated procedural problems of Federal agency granting mechanisms might be avoided. Many local and state non-profit citizen groups commented that complicated granting procedures serve to discourage them from applying for Federal funds.

The types of projects that could be funded by these centers could cover a broad spectrum. Examples of NEH projects presented at meetings and described in correspondence include:

- A special Summer 1975 issue of the Wisconsin Academy Review, entitled "Science, Technology and Human Values."

- Conferences, forums, dialogs, held on campuses and in regional libraries that are expected to involve about 50,000 people in the State of Georgia this year. Dr. Richard Wiegand, Executive Director of the Department of Continuing Education at Georgia Institute of Technology and Chairman of the Georgia State-based Committee, in speaking of the program said: "Essentially we try to fund the programs that seem to say that [those attending] will have a chance to talk back. We don't like to fund programs that are just lecture series, [but] an opportunity for an active involvement with the audience..."

- A Tennessee series of 10 programs on "The State of Health" that are shown in conjunction with special discussion groups and a published study guide.

• A conference on problems of the Guadalupe River, Texas that was attended by 183 people. At the Dallas meeting Dr. Sandra Myres, former Director of the Texas Committee for Humanities and Public Policy in Arlington described it: "Those of you from Texas may recall that landowners and canoers were taking potshots at each other, so with more guts than good sense, we decided the thing to do was to bring the two groups together with academic humanists and let them sit down and talk about their problem, using the disciplines of the humanities to remove some of the heat, shed some light and to put some of ... the problems into historical perspective." She cited the conferees as including a cultural geographer who talked about different attitudes toward land and water held by the city dweller as opposed to the country dweller; a professor of jurisprudence who traced the Texas law on navigable streams and an engineer hydrographer from Dallas who took the group to the river and demonstrated that under present law it was impossible to apply the law to the tools which he had at his disposal to determine whether a streambed was navigable. Dr. Myres recalled, "a law student from SMU [sat there] with all these ranchers and Stetsons and boots for two days crosslegged on the table...with beard and sandals and everyone wondered what was going to happen when he got up." She related that he turned out to be the most popular speaker at the conference--clarifying the values, questions and the problems raised. Out of this program came the decision that the two groups basically shared the desire for preservation of land and water, and could work together. They were able to develop a viable plan to be presented to Texas Parks

and Wildlife now being implemented. Dr. Myres summed up "...here is a case in which we combined science, humanities, a public policy issue and state officials to discuss a problem and at least began some steps towards its resolution."

Based on NEH experience, four to six months of planning are needed to establish policy areas for support and to establish an operating ad hoc committee in a State. Thus, NSF foresees that actual grants could be made in the first year of the program if pilot centers were established. Usually one or two professional staff and one support staff are needed by each state committee, but this can vary with size of the state.

Potential Problems with Program Option:

Participants at the public meetings cited several problems with the NEH approach. Dr. Myres commented on the problem of getting the public, particularly those who normally don't attend such meetings, to participate. The second problem she cited was that of maintaining balanced presentations. "...of course if at any time you deal with a public policy issue, you are going to from time to time get into political fights, although we must be non-advocacy, although we stress over and over again to our re-grantees that every program must be balanced, every point of view must be presented on a controversial topic and sometimes this is much easier to say than to actually do. So all right, you have two speakers, one pro and anti ERA and one turns out to be very fine and eloquent speaker and the other one isn't really very well prepared, you've left yourself open to the charge, well, we didn't really get equal time. There is this possibility any time you're dealing with a political matter, that you're going to come in for some criticism."

At the Chicago meeting, Donald Ralston, Co-Director of the Center for Rural Affairs, Walthill, Nebraska, suggested that the fifty percent, non-Federal matching requirements should be reduced or eliminated for projects in rural areas. He told the SFC public meetings in Chicago:

> "To meet this fifty per cent requirement, we had to stretch the definition of allowable costs and had to spend an inordinate amount of administrative effort in recording and documenting these costs. It would be self-defeating for the National Science Foundation to want to bring the resources of the scientific community to rural America and then turn around and drain away more of its already scarce resources in order to do it."

He also recommended that the program "encourage interdisciplinary dialogues and be reasonable in defining who is and who is not a scientist. We involved a cultural geographer in the Humanities program we administered. We were told he did not qualify as a humanist. Strict definitions like this tend to stifle and limit dialogue to more select audiences which the Science for Citizens Program should try to avoid."

Finally, there may be some potential problem in the makeup of the ad hoc committees. Using the NEH program model, the committees in the SFC program would be equally divided among scientists and engineers, institutional administrators and members of the public. In the testimony on the SFC program, many non-profit public interest groups and individuals stressed the need for a citizen majority on advisory councils that would be determining SFC policy and grants. NSF believes that some balance among

interested groups is necessary in order to obtain state-wide support for such a program. However, the Foundation does recognize that there will be interest in an increase in the percentage of public members on the ad hoc committees.

Implementation and Timing: Based on the NEH experience, the administrative cost of a 4-6 months planning grant for a center is $20,000, with larger states such as New York and California costing about $35,000. Planning grants support state and local public meetings to discuss potential themes for the program and the establishment of the ad hoc committee. Once in operation, State-based centers receive a 12-month $40,000 administrative grant. The amount for regranting purposes can vary; it currently ranges from $121,000 to $460,000. The average grant from the NEH State-based centers is $5,000. Grants have ranged from $150 to $50,000. About 30 grants are made a year by a center.

It would appear feasible to start this program on a small pilot experimental basis by funding 3 centers the first year. Assuming $20,000 for each center's start-up costs, $20,000 for ½ year administrative costs, and $75,000 for grant purposes for 3 centers, the total would be $345,000.

OPTION: SCIENTISTS AND ENGINEERS ASSOCIATES PROGRAM

Description of Program Option: NSF could sponsor a national competition for a Scientists and Engineers Associates Program.

There are several existing programs that could serve as a model for this option, notably the Congressional Scientist-Fellow Program of AAAS, in which scientists and engineers are placed on congressional staffs for one year, as well as NSF's National Needs Fellowship Program. The program would provide grants to scientists and engineers who are interested in working on public policy issues for at least one year. Recipients would be able to pursue their work in public and private sector institutions. Based upon the materials presented to the SFC program in the public participation process, three categories of institutions were cited most often as needing such expertise;

- non-profit citizens public interest groups
- regional, state, and local governmental agencies or units; such as state legislatures, mayors' offices, county commissioners' offices
- media organizations

NSF would have to carefully consider the criteria for selecting Associates. Several suggested criteria are: the technical competence of the applicant, i.e., ability to produce information or analyses which will pass peer review; and the policy competence of the applicant, i.e., ability to formulate a problem and present conclusions that raise the level of debate on important

policy issues. Once selected, the applicant would be free to choose where the work would be done, although in the case of public interest groups NSF could require that work be carried on in an already established non-profit organization with a professional staff. Freedom to publish findings and fully participate in the work of the organization would be assured.

The formation of NSF selection panels would also be important in designing this program and specific criteria would have to be developed. Applications would be solicited through an NSF announcement of a national competition similar to that of NSF's National Needs Fellowship Program. This program is currently limited to participation in non-profit educational institutions for one year. The proposed Scientists and Engineers Associates Program could run up to two years. Compensation could include the recipient's salary at his/her own place of employment, plus a stiped of $1,000 to cover expenses.

Short Term Grants: A variation of the Associate Program would be to support a short-term program of about 3 months duration. This could be implemented either through a separate national competition or competitions in states through the State based centers as described elsewhere in this report. These short-term efforts could provide smaller citizens groups with needed professional assistance to upgrade their technical expertise, and could potentially make assistance available to state legislatures during consideration of specific issues requiring the expertise of scientists and engineers. Media organizations might also make use of a short-term expert for participating in a series of programs on particular issues.

Media Programs: Another possible variation of this option would be to separately establish national or short-term state programs to allow scientists and engineers to work in media and media-related organizations; television and radio stations (both commercial and educational) newspapers, or in schools of journalism and communications. The Associates would be able to:

- advise on production of television news stories with scientific and technological content,
- provide advise to persons in media on ways to report scientific information and events,
- contribute to the efforts of journalism schools to teach communication of scientific information.

It would be useful if a conference involving Associates, members of the organizations they worked with, second year Associates and interested groups and individuals was held after the program's first year, so that knowledge and experience could be shared.

In carrying out the aspect of this program option involving state legislatures, the SFC program would work closely with RANN's Intergovernmental Science Program. The aims of this RANN effort are to integrate science and technology into the policy and program planning, and program implementation activities of state and local governments. One of the program's major thrusts is to provide an increased awareness and understanding by lawmakers and public administrators of national, state, and local issues which have scientific and technological ramifications. Support has been given to a number of projects to improve state legislative activities in Kentucky, Wisconsin, New York, California and Alabama.

Needs Addressed: It is NSF's view that a national Associate competition would help focus public attention on the contributions of public interest science, and thus enhance the dialogue on policy issues with scientific and technological ramifications. Dr. Jeffrey Kirsch, Director of the Science Office - KPBS-TV in San Diego, California, told the San Francisco public meeting of his successful efforts to obtain volunteer help from the science community to participate in local science television programs. In presenting a suggestion that fellowships or grants to scientists should be given to work in public interest groups of the media Dr. Kirsch, said: "It should be stressed that respectability for public interest science can only be achieved if NSF encourages senior science professionals to spend sabbaticals and leaves-of-absence in public interest science. Participation could in fact, be given equal status to other research endeavors provided that certain criteria are met."

A grant of at least one year would provide opportunities for scientists and engineers to undertake long-term projects, a need expressed both by them and the citizens public interest groups. It provides a career opportunity for the public interest scientist and engineer. Organizations in which Associates worked would obtain needed resources of technical expertise at no cost. The short-term opportunities could be useful for completing specific smaller projects or to start up long-term efforts.

The media sub-option has been developed because of the need expressed for better communication between scientists and journalists in order to increase public understanding of scientific and technological issues. In the public

meetings, several expressed concern over the decline in the number of full-time science writers on national newspapers, and urged expanded contacts between the scientific community and the media, particularly television. The proposed program, which would bring the scientist and engineer into media organizations and/or schools of journalism would be geared to alleviation of these concerns.

One result of the Associate program beyond the actual work accomplished would be the value to the Associate. The experience in a public service or media organization could have a multiplier effect: a rewarding experience would be transmitted to the Associate's colleagues, and might encourage an Associate to develop a long-term commitment to such work after returning to his original position.

Potential Problems: NSF does not foresee any major disadvantages to the National Associates program.

Some potential problems might be seen in connection with the term option. At the Boston meeting, Peter Clark, Executive Director of the Center for Energy Policy, stated that the biggest problem in finding expert assistance was to obtain it for short periods of time. While the grants would alleviate the high cost of short-term personnel, it might still not produce a solution to the problem pointed out by Clark and others: that there is no stockpile of people available on a month or two basis to do an in-depth scientific piece of work.

Implementation and Timing: The cost for each Associate funded is estimated at $25,000. This figure is based on recent NSF statistics showing the 1974 median annual salary for doctoral scientists and engineers was $21,900; for masters' degree holders, $19,400; for bachelors', $18,800. With some allowance for inflation, and including an expense stipend of $1,000, this should be sufficient. In the first year, consideration could be given to selecting between 5 and 10 Associates in the national competition, a total of $250,000. Anywhere from 10 to 20 grants for short-term efforts could be given as well. Assuming a 3-month tenure, the cost of each would be about $6,500. If 20 are given, the total cost would be $130,000. The implementation of a separate media program could be deferred until the second year, with first year applicants eligible to elect to work with the media, non-profit groups or regional, state, or local government agencies.

OPTION: INTERNSHIP PROGRAM FOR SCIENCE AND ENGINEERING UNDERGRADUATE AND GRADUATE STUDENTS

Description of Program Option: NSF could support programs in colleges and universities to provide undergraduate and graduate science and engineering students an opportunity to work on policy issues in public interest groups and the media.

An NSF-sponsored internship program would:

- assist in the placement of science and engineering students in nonprofit citizens organizations to work part-time on related public policy issues during the academic year;
- offer lectures, guest speakers and seminars on government and public affairs, and media-related skills to enrolled students as an adjunct to the practical work experience;
- publish papers resulting from the students' internship work.

The program could also be designed to involve students from communications and journalism schools in training and educational programs aimed at improving their understanding of scientific and technological concerns and thus their ability to communicate them.

Summer Stipends: Another component of this program would be to provide grants to undergraduate and graduate students of science and engineering for summer (3 months) work in public interest organizations or the media. These grants would be in the form of a small stipend to enable students to participate. Some requirements for the program might include:

- prior assurance that the students will be undertaking work in an area related to their fields within the public policy setting; responsibility for obtaining the summer employment would be that of students, who would then apply for the stipend;
- a paper or product of some kind showing results of the summer's activity.

There are various models of programs now underway which enable students to gain practical experience while earning degrees. Examples include American University's Washington Semester Program in which undergraduate students work in Federal agencies or congressional offices, and attend seminars and lectures for college credit.

In the materials presented as suggestions for the SFC program, some examples of media undertakings were provided. The Wenner-Gren Foundation and the Russell Sage Foundation have funded media internships for science students. The Mass Media Intern Program of AAAS, supported by NSF and the Russell Sage Foundation allows up to 15 graduate students in the social and natural sciences to spend a summer as intern reporters, production assistants or researchers in the various media organizations.

Needs Addressed:

A number of SFC participants spoke of the need for increasing communication between the scientific community and the public who oftentimes have difficulty understanding each other. It was suggested that if science and engineering students were to become involved in the public policy process, there would be improved levels of communication as they continued their careers. Several

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participants suggested that if science and engineering students were involved in public interest science activities at an early stage of their career they would remain committed to similar activities after they received their degrees.

Ms. Wendy Weisman-Dermer, formerly with the AAAS program, said at the Atlanta meeting that in addition to assisting the students gain an understanding of information dissemination about public affairs, "participating media also benefit from the presence of people with social and natural science knowledge and skills." Dr. Martin Topper, Assistant Professor of Anthropology at SMU, who proposed expansion and continuation of media internships, viewed them as "an attempt to increase the awareness of scientists and newsmen as to the value which each group has for the other." He stated "it would also be expected that an internship of three months' duration would be sufficient for the intern to acquire some basic skills (use of various media) as well."

Other potential advantages of a program of this kind is that if journalism students become involved, perhaps more would consider science reporting as a career or, at a minimum, be aided in their reportorial capacities. Additionally, by providing students an opportunity to work with public interest groups, these groups would be receiving free assistance from people knowledgeable about scientific matters. A few organizations said that the student interns who currently worked for them were a very valuable resource, that they possessed up-to-date information and worked enthusiastically.

Potential Problems:

Part time work and summer jobs often tend to be of a clerical nature, without major opportunities for substantive contributions, and programs would have to be carefully drawn to ensure against this.

There might also be skepticism on the part of faculty advisors who view such participation as related to completion of a degree and would therefore discourage participation. Wendy Weisman-Dermer alluded to this in her Atlanta statement when she told of the first planning meeting on the AAAS program. "It is worth noting that the committee members feared that few first rate natural science students would be interested in giving up a summer of research endeavors in favor of a journalistic experience, and that even fewer faculty advisors would encourage them to do so. However, six out of the ten 1975 interns were from the natural sciences. Most of them received enthusiastic endorsement from their faculty advisors, and all felt that the experience was an invaluable one that would help them in the future whether they pursued academic or non-academic careers."

Another potential problem is that the numbers of students benefitting from the programs would be small unless the program model were duplicated elsewhere.

Implementation and Timing:

One or two pilot internship programs could be funded at colleges and universities during the first year of the Science for Citizens Program. If funds were made available to programs with ongoing work/study components

or interdisciplinary studies involving public affairs and scientific concerns, more rapid implementation of the program might be achieved. A component of these pilot programs would be the preparation of technical assistance, training and demonstration materials concerned with setting up a program. These could be provided to other academic institutions as a means of starting new programs.

These pilot efforts could fund up to 10 students, at a total cost of $50,000 for a six-month program. If the summer grant program were implemented perhaps 25 such grants could be given through a national competition in the first year at a cost of $45,000.

An alternative method of funding the program would be to implement it through the State-based centers described elsewhere in this report.

OPTION: ESTABLISHMENT OF A NATIONAL CLEARINGHOUSE WITH REGIONAL BRANCHES

Description of Program Option: NSF would establish a National Clearinghouse to serve as a central repository of major works bearing on public policy issues. It would be designed to meet the expressed needs for access to research, information and materials relating to such public policy issues. It would also be designed to assure the widest possible compilation and utilization of existing research, information, and other materials through providing active and anticipatory as well as responsive services.

The central repository would include selected materials from NSF and other Federal agencies and organizations outside the government that generate research and other materials related to major public policy issues. NTIS microfiche could also be selected for inclusion in the repository.

The Clearinghouse would take whatever steps necessary to assure the ready access to federally funded research reports and directions relating to information and other resources.

The Clearinghouse would provide information dissemination services, drawing in part upon the development and compilation of new and existing materials as described elsewhere in the option concerned with media programs. Newly developed materials such as the "California Issues" media package, mentioned in the summaries, could be included in such a repository and distribution center. As an adjunct to this, NSF would

provide funds to the Educational Resources Information Center (ERIC) or other existing audio-visual repositories to build up an inventory of audio-visual materials related to public policy issues. Lists of available materials could be widely disseminated. Audio-visual materials would be loaned free of charge in hardship cases, or else could be rented for nominal fees. Mr. Russ Guest of the Denver Community Video Center was one of several who noted the need for better access to audio-visual materials.

Needs Addressed: Some of the wide range of needs addressed by this option were identified by Dr. Martin Topper, Assistant Professor of Anthropology at Southern Methodist University, when he recommended that science information centers or clearinghouses be established, noting the scattered state of scientific and technological knowledge in the U.S. Dr. M. Wilcox, Professor of Mechanical Engineering at Southern Methodist University also had urged that NSF act as a clearinghouse for information. He specified that particular attention should be directed to the information needs of local and state public bodies, that such a clearinghouse disperse news of technical and scientific programs to state and local governments, and that it provide technical and scientific information on public policy issues. Dr. Harry Stevens, who spoke on behalf of Representative Thomas Mahoney at the Boston hearings underscored the need for the sort of science resource network and informational services which national and regional clearinghouses would address.

Charles G. Overberger and Alvin F. Zander, Vice President and Associate Vice President for Research of the University of Michigan, Ann Arbor,

Michigan suggested that the NSF program serve as a source of information about where answers on crucial public policy issues can be obtained. Patricia A. Porter, Assistant Legislative Counsel, Legislature of the United States, Virgin Islands, and Gino Crocetti, Ph.D. Candidate in Public Policy at the Union Graduate School, submitted a joint statement in which they noted that there is a wealth of information available in public sources and especially in government reports and files that would have great utility for many public policy issues and discussions, both national and local. They noted that from the point of view of most local groups, and even many scientists and engineers, this information is effectively nonexistent. They suggested that the SFC program establish a means of making such information available.

Mr. James E. Gutman of Maryland spoke of the need not only for greater access to printed materials, but urged that free distribution of scientific research reports to citizens be provided under the SFC program. Mr. Gutman mentioned that in order to serve intelligently on several local and regional committees of which he is a member, it is imperative that he have ready access to a variety of Federal research reports. Few are in the public library and none are available for general circulation. In his view acquiring them through NTIS would be prohibitively expensive.

Potential Problems: Clearinghouses which serve as information repositories and provide referral and information dissemination services are not always well run, well publicized, or well utilized. Success of such efforts also depends on the ability of those with responsibility for the overall operation

to establish and maintain the closest of working relationships with the other agencies, organizations, and groups engaged in performing functions or providing services which relate to those provided by the clearinghouse. The national clearinghouse would need to establish relationships with other Federal level and national resources if the subsequent establishment of regional science service centers serving as regional clearinghouses are to be on sound footing. Close working relationships would be established with the National Referral Center of the Science and Technology Division of the Library of Congress. Funds could be allocated to the National Referral Center to handle the demand for referral services generated by the SFC program.

Close working relationships or cooperative arrangements would be established with major public and private sector information retrieval dissemination, technology transfer, technical assistance, and referral services, e.g., EPA, ORNL, FEA, ERDA, NIH, USDA Extension Service, VISTA, and the Engineering and Management Technology Extension System for Oklahoma (an NSF funded project at Oklahoma State University). Liaison should also be established with major related efforts of national public interest groups and professional societies, organizations, and associations. These include the Model Interstate Science and Technology Information Clearinghouse (MISTIC) of the Committee on Science and Technology of the National Conference of State Legislatures (a project funded by the Office of Intergovernmental Science Program of NSF, receiving funds from a half dozen Federal agencies); the Pennsylvania Technical Assistance Program of the Pennsylvania State University;

the Public Interest Economics Foundation; the Center for Science in the Public Interest; the American Association for the Advancement of Science; the Commission for the Advancement of Public Interest Organizations, Association of Voluntary Action Scholars; the Biophysical Society; and Volunteers in Technical Assistance (VITA); as well as other organizations and associations.

Many persons noted the need for coordination and fullest possible utilization of existing resources. These included Peter Smith, President, Society for Technical Communication, Washington, D. C. who urged that existing networks of those concerned with the communication of scientific and technical knowledge be fully taken into account in the design and implementation of the program. William J. Hargis, Jr., Director, Commonwealth of Virginia, Virginia Institute of Marine Science, Gloucester Point similarly spoke of the need for the SFC program to be coordinated with existing programs. He particularly cited Marine Advisory programs, the Department of Agriculture Cooperative Extension Program and other Federally sponsored programs which have provided technological education or information to the public for a number of years.

Charles F. D'Agostino, Director, Louisiana Technology Transfer Office, Office of the Governor, suggested that the SFC program offer a referral system to pass on information to participants and urged that NSF coordinate efforts with state and local science and technology agencies, and complement the program with a listing of other Federal science and technology programs to assure fullest possible utilization of existing resources.

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Implementation and Timing: NSF could use its in-house information retrieval and dissemination services of the RANN Document Center in establishing a National Clearinghouse. One regional branch could be established within the first year of operation with others to be added in the following year. (See Regional Science Service Center for a description of such regional branches.)

First year funding, if existing NSF in-house services are used, would be $250,000. The establishment of one regional branch in the first year would be between $100,000 and $200,000 depending upon whether an existing information repository served as the basis. (See discussion of clearinghouse component in the Regional Science Service Center option.) Fifty thousand dollars would be spent in the first year of the SFC program to develop and implement a plan for making such Federal research reports and directions more readily accessible through mail, lending libraries or the distribution of microfiche in conjunction with NTIS, National Reference Center and/or other means.

Total first year funding for the National Clearinghouse Branch, including funding directed toward making Federal reports and directions more accessible, would be between $400,000 and $500,000 (depending upon whether or not the Regional Clearinghouse was established using an existing information repository as a basis).

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OPTION: ESTABLISHMENT OF REGIONAL CENTERS

NSF would support the establishment of regional resource centers. There are several suggested models for the establishment of such centers. Two which seem to warrant consideration are:

1) Regional Science Service Centers
2) Regional Issues Centers

REGIONAL SCIENCE SERVICE CENTERS

Description of Program Sub-Option

Regional Science Service Centers would be established to serve in part as information clearinghouses from which any persons who wished could obtain information, research related materials, and other materials concerned with relevant issues and problem areas. Such centers would serve as a means of collecting as well as generating and disseminating such materials. The materials collected would include those generated by government as well as non-goverment entities.

The centers would also serve as a place where individuals or groups might seek technical assistance or related expert services or referral to such services and expertise. Aspects of the services and activities provided by the centers would be modelled after the Agricultural Extension Service and the non-profit group VITA (Volunteers in Technical Assistance).

Regional Science Service Centers would provide services and activities that would include:

- Serving as a regional branch of the National Clearinghouse described elsewhere. This would include serving as a repository of information, and materials concerned with local, regional, national and global policies and problems and with resources and approaches that can be brought to bear

to resolve policy issues and problems. Informational and other materials concerning the centers' services and programs could be actively disseminated through existing organizations and institutions, and via media publicity campaigns.

- Maintaining a collection of existing rosters and establishing a new roster of individuals and organizations willing to provide services on a pro bono, expenses or reduced fee basis to citizens or citizens' groups, public interest groups or public officials concerned with public policy issues. (See the option on the establishment of registries for further details.)

- Providing referral services where appropriate. The possibility would be explored of providing funding to the National Referral Center of the Library of Congress to provide additional staff to gather information concerning regional resources and to respond to regional inquiries regarding resources and information available regionally and nationally.

- Providing technical assistance services by telephone as well as outreach approaches, utilizing volunteers and interns or associates to provide such services. (See intern-associates options for further description of that option.)

- Sponsoring workshops, forums, and conferences in collaboration with the National SFC program. Some would address local and regional concerns identified locally and regionally and some would address national and global concerns. (See the option concerning forums, workshops, and conferences for further details.)

- Holding hearings annually to provide an opportunity to citizens and citizens' groups and others to voice their views concerning the

overall SFC program and to identify issues to be addressed, suggest new program initiatives and participate in a two-way dialogue with officials overseeing the NSF/SFC program.

Needs Addressed: The Regional Science Service Centers would respond to a range of needs identified by participants in the SFC planning process. One such was for a network like that of the agricultural extension programs which would provide for the transferring of scientific and technical information to citizens. Robert W. Kaufman, Director, Western Michigan University, Institute of Public Affairs, Kalamazoo, Michigan, was among those expressing the need for such a network.

Regional Science Service Centers would also address needs cited by others as a means for transferring scientific and technical information to local decision makers, and planning and citizens' groups.

Patricia Maher, an educational specialist and a director of a pilot program in Southern Maryland, designed to provide such information services, also spoke of the need to provide citizens the information they want and of the need to open up avenues of communication and information among local organizations and resources.

Regional Science Service Centers would house files of references about solutions to similar problems and engage in developing and coordinating provision of information and resources for similar technical programs. The Centers would also set up programs on issues and problems. They

follow a similar approach to that of the non-profit group VITA (Volunteers in Technical Assistance). Dr. Susan Hadden of the Southern Center for Studies in Public Policy (the Southern Center is an autonomous body of Clark University) and Joseph A. Barreca of Jaybird Information, Republic, Washington had been among those suggesting such approaches.

The Regional Science Service Centers would be addressing the same types of needs in quite similar ways to those suggested by Arnold M. Horwitch, Center for the Humanities, Arizona State University, Tempe, Arizona. The suggestions were drawn from his letter and a proposal developed by a group of upper classmen and graduate students. The Centers described in this proposal would be involved in assimilating, storing, retrieving, and disseminating scientific and technological information relevant to issues of public concern that involve science and technology. These issues would span the gamut of local, state, regional and national issues. The Regional Centers described here would also involve issues of global scope.

Potential Problems: The expense of providing regional centers is high, requiring long-term commitment of available funds. Care would need to be taken that such centers pay off by providing the highest quality of services and activities to meet the needs of those served. Close working relationships would need to be established with Federal as well as public and private sector organizations engaged in providing some of the same types of services and activities that the Regional Service Centers would provide. In this way coordination and collaboration would minimize any unnecessary duplication of efforts.

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Implementation and Timing: Over a three-year period, between seven to ten centers could be established in different geographical areas of the United States providing coverage to the continental United States and Alaska, Hawaii, and Puerto Rico. One such center would be established in the first year on a pilot basis. If the Regional Service Center is to serve as a regional branch of a national clearinghouse, its establishment would begin as soon after the establishment of a national clearinghouse as possible.

The funding of the clearinghouse component of each service center would be between $100,000 and $200,000 in the first year of operation depending upon whether or not an existing information repository could be found to serve as the basis for this function. These funds would include monies for the generation, compilation, collection and dissemination of materials. Funding levels of $25,000 for each regional center for the maintenance of rosters and collection of existing rosters would be provided. Funding in the amount of $25,000 for each regional center could be provided for one and one-half to two persons to serve as staff for referral services.

Such funding might be given directly to the National Referral Center of the Library of Congress to pay for providing referral services on a regional basis. Funding in the amount of $50,000 for a pilot program would provide telephone as well as outreach technical assistance services utilizing the services of volunteers. Funds would be earmarked primarily

for administrative services to run this program. Funding in the amount of $50,000 a year would be provided for each regional center for workshops, forums, and conferences. Total funding for each Regional Science Service Center would be between $250,000 - $350,000 depending upon whether or not an existing information repository served as the basis for the clearinghouse component.

REGIONAL ISSUES CENTERS

Description of Program Sub-Option

A number of centers would be established on a regional basis, such as in the New England or midwestern states. Their major purpose would be to undertake research and disseminate information on public policy issues of specific regional concern. Suggested tasks for these centers are:

- serving as a mechanism for bringing together scientists, engineers, citizens and public policymakers on research projects involving issues of regional concern, such as off-shore drilling, power plant siting;

- organizing workshops and conferences;

- serving as a clearinghouse for disseminating informational materials to interested individuals and organizations;

- establishing a resource information system on specific topics available to individuals and organizations.

These centers would be established by a qualified applicant after a competitive proposal procedure. They could be set up through

an existing established entity such as a university or a non-profit institution. Among the requirements for establishing a center would be:

- evidence of participation and support on a regional basis of interested organizations, individuals and public officials;

- an advisory board of scientists and engineers, institutional administrators and members of the public responsible for determining the priority of projects undertaken, assuring balanced presentation of views in research projects and forums, and providing direction to the center's clearinghouse functions.

Needs Addressed: The centers would provide a source of information where members of the public, public interest organizations, and regional governmental officials could obtain information on relevant issues. Many of the policy issues related to scientific and technological concerns revolve around issues irrespective of state boundaries and have regional implications. Decisions by one state government in these areas directly effect those of its neighbors, and regional approaches to problem solving are becoming increasingly important.

Several examples of the activities of broad-based regional groups were presented at the SFC public meetings. In Denver, Reed Kelley described the Rocky Mountain Center on Environment (ROMCO) which "places particular emphasis on the importance of including local officials and citizens, in conjunction with technical personnel, in the decision-making process. ROMCO is guided by a thirty-member Board of Directors composed of regional leaders in business, industry, government, academic institutions, and

the environmental movement, all of whom have in common the concern for the environment of the Rocky Mountain States." ROMCO's activities, he pointed out, are directed at practical, results-oriented work, in such areas as the effect of coal development in the Northern Great Plains.

One of the roles which these types of centers might play is to meet the needs of public interest organizations for information. Perry Hagenstein described the benefits of his organization as follows: "...There is an important role to be played by organizations such as the New England Natural Resource Center, which are professional and focus on public policy issues in practical ways, but at the same time service the information needs of citizen organizations. Organizations such as the center can be used as umbrella organizations with administrative capabilities to do projects that involve a number of scientists, citizen groups, and individuals. They can also be used to review potential problem areas, to help in defining specific areas where detailed work involving citizen groups would be most fruitful. In a sense, organizations such as the center can serve as a cabinet for citizen groups."

Potential Problems: Needed widespread support on a regional basis for such a center may prove to be a difficult task. A determination would have to be made whether to establish such centers on a long-term basis, or provide funding for a limited number of research, workshop and dissemination activities, for a shorter term. In addition, some of the

centers' activities might also duplicate clearinghouse efforts of the other SFC activities described in this report.

Implementation and Timing: Assuming that an existing entity would be the recipient of this program option and thus cover potential overhead costs, one center could be funded on a pilot basis at a level of $75,000.

OPTION: FORUMS, CONFERENCES, AND WORKSHOPS

Description of Program Option: NSF would sponsor forums, conferences, and workshops on public policy issues involving significant scientific and technological concerns.

These forums, conferences, and workshops would be an important follow-up to the meetings held to discuss the SFC program. They could facilitate direct communication and provide opportunities for exchanging information, both being key aspects of the SFC's stated objectives. Informational materials, reports, and summaries of workshops, etc., would provide an important means of assuring maximum impact of these forums, conferences, and workshops.

The option would be implemented by utilizing a combination of program techniques. These include:

- Funding forums and conferences at the national level focused on national and/or global problems
- Funding forums and conferences at the regional level focused on national/global and regional/local problems
- Funding national workshops involving scientists and engineers from within and outside the Federal Government concerned with the state-of-the-art with respect to specific policy issues or problem areas, e.g. carcinogenic health hazards nuclear safety, solar energy and other alternative energy sources
- Funding workshop opportunities for Federal policy makers and program

implementors, and scientists and engineers from within and outside the Federal Government, and for all others, including concerned individuals, citizens, groups, professional associations, etc., to engage in a dialogue on specific topics and to address matters involving resolution of policy issues and the solution of societal problems.

Formats for the conferences that could be strongly considered include the format used in the 1975 Club of Rome/University of Houston meeting. The World Future Society Energy Conference and Congresses provide other models that could also be used for conferences funded under the SFC program. A conference format could also be used involving two panels, the first being technical in its orientation, the second involving those concerned with integrating technical information with policy decisions. This second panel, which would be cross-disciplinary, would include representatives from various government and private sector agencies as well as technical experts. Mr. Alan Ladwig with the Forum for Advancement of Students in Science and Technology suggested the formation of conferences along such lines. Another suggestion was that workships designed in a similar two stage way could be held prior to conferences

Topics for national forums, conferences, and workshops could be determined at the national level and would include consideration of the inputs of those contributing to the planning of the SFC program and consultation with an ad hoc or voluntary advisory group. Topics for regional forums, conferences and workshops could be determined at the regional and local levels.

Professional societies and national public interest organizations would be asked to suggest speakers and panel members, and to compile lists of potential attendees. The mechanics of making arrangements for meetings at the national level could be handled by contract. The SFC program would also coordinate this activity with other interested Federal agencies, such as ERDA, FEA, EPA, NIH, etc.

The proceedings or summaries of the proceedings of conferences, forums and workshops, could be published. Dissemination through professional societies and public interest organizations, as well as through the clearing-house mechanism and regional and/or state based centers outlined in other options could also be undertaken. Dissemination could also be effected through media programs such as those outlined in the media option.

Needs Addressed: This option responds to a wide range of needs including needs expressed by Gloria Glissmeyer, Assistant Professor of English, California State University at Chico, who saw the SFC program "as helping people determine what our critical choices are and providing them an initiative for sitting down together and identifying issues and developing strategies for raising us to a level of successful coping with those issues."

A most basic need identified by Perry Hagenstein of the New England Natural Resource Center at the Boston hearing, is the holding of conference workshops that could contribute significantly to the development of public understanding of public policy issues having scientific and technical aspects. At the same hearing, Fritz Petersohn of the New England Section of the American Congress on Surveying and Mapping expressed his view that NSF should support

efforts to establish avenues of communication through which contact between various groups can be inaugurated. To carry this out, he suggested, among other things, that interdisciplinary meetings be held. Ms. Patricia Maher, director of a pilot program to provide scientific and technical information to local decision making, planning, and citizens groups in Southern Maryland, expressed her view that NSF should support meetings and workshops where scientists and engineers could meet with citizens to discuss local or regional issues as well as issues of broad national scope.

Similar needs were expressed by George Burke of the G. E. Burke Company at the Denver hearings. Mr. Burke felt that under the auspices of the SFC program seminars should be held in which all types of people could be brought together--business, professionals, and consumers. Through such seminars he saw the program as truly reflecting consensus of the citizenry, providing for a mixing of those with practical theoretical orientations.

The program option could also be responsive to the needs expressed by John Bermeuler, university student speaking at the Denver hearing. He felt that most university classes are not activity-oriented and that workshops are needed in schools which stress the practical applications of theory. In addressing this need the forums, workshops, and conferences could stress inclusion of students as participants, and educational institutions could be encouraged to provide course credit for participation as well as for related course work that could be undertaken in connection with such meetings.

Potential Problems: There has been considerable disillusionment on the part of many individuals with conferences and workshops. Such meetings are seen by many as "wheelspinning" exercises with few specific results. The conferences and workshops that would be conducted under this option would need to be well planned so that the time of those attending and the resources invested are not wasted.

Implementation and Timing

The funding for national level forums and conferences would be $50,000 for the first year. One national level conference cover a range of national and global problems could be held in the first year.

The funding for forums and conferences to be held regionally, focusing on national and global as well as regional and local problems, would be $25,000. This would represent pilot funding for use by one region in the first year of operation.

Four national level workshops and one national and one regional conference focusing on a range of topics would be held during the first year. At least ten workshops could be held--five involving scientists and engineers concerned with the state of the art of a given policy or problem area and five involving Federal policy makers, scientists and engineers and all others. Funding levels for each workshop would be $12,500; first year funding would thus be $50,000. Total first year funding for this option would be $125,000.

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OPTION: GRANTS TO INDEPENDENT JOURNALS

Description of Program Option: Grants would be made to national organizations whose journals reach scientists and engineers, as well to those whose journals are directed to policy makers and administrators. The purpose of this program option is to provide additional outlets for research work on scientific and technological concerns as they interact with public policy. Funds granted under this program option would not be given for the purpose of supporting the establishment of a new journal, or for the purpose of fully supporting existing ones.

An alternative option would be grants to commission and/or publish reports or papers generated by public interest activities of the scientific and technical professional societies.

As an alternative to national funding, state-based centers would support journals as one of their regranting activities.

Needs Addressed: Each of the above is directed toward remedying perceived lack of journals currently publishing articles on research in science and public policy issues. This concern has been stressed by citizens public interest and other individuals doing research and publishing work.

Sam Day, editor of the Bulletin of the Atomic Scientists, stated "the high costs of magazine publishing place severe limitations on the funds available to us for research, analysis and commentary. Many worthwhile projects are simply beyond our means because of fund limitations. Enrichment is generally possible only insofar as it can financed by special contributions from our readers or from grants from private foundations."

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The scientific and technical societies hold panel meetings and sometimes undertake special projects involving issues of public concern. These efforts might be further encouraged if funding for publication were available through NSF.

Potential Problems: The need to increase publication of more easily understood information pertaining to science and technology was often expressed. It might be argued that putting funds into journals which do not receive widespread public attention is not the most effective utilization of SFC funds.

Implementation and Timing: During the first year of the SFC program, application could be received and evaluated, grant awards made, at the beginning of the program's second year of operation. Grant support available would total $50,000.

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RELATIONSHIP OF PROGRAM OPTIONS TO SFC OBJECTIVES

The chart on the following page displays the relationship between the program options and the SFC objectives they are designed to meet.

This relationship is shown in terms of the level at which responsibility for implementing a program option would be placed. The grant and/or contract mechanism for supporting programs is described in the Options section.

For example national level competitions would be held for the Scientists and Engineers Associates Program, and forums, workshops and conferences would be sponsored through the SFC Program office.

At the regional level, resource centers established by NSF would carry on their particular functions.

The state-based centers would be responsible for a range of activities of a state and local nature. These activities would include their own forums, and media programs, for example, separate from the programs sponsored at the national or regional level.

Specific local level projects would be funded through the State-based centers. But in addition, local groups could utilize the services of the National Clearinghouse and/or regional service centers.

As the description of options indicates, certain programs or aspects of them could alternatively be supported at the national, regional or state level. For example, in addition to a national Scientists and Engineers Associates Program, a similar short-term program could be operated by a State-based center. These alternatives are displayed on the accompanying chart.

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RELATIONSHIP OF SFC OBJECTIVES TO PROGRAM OPTIONS BY LEVEL OF IMPLEMENTATION

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SFC OBJECTIVES	NATIONAL	REGIONAL	STATE	LOCAL
TO IMPROVE PUBLIC UNDERSTANDING OF PUBLIC POLICY ISSUES INVOLVING SCIENCE & TECHNOLOGY	Media Programs Associates Student Internships National Clearinghouse Forums, Workshops, Conferences Journals	Regional Resource Centers • Scientific Service Centers: registries;* branches of clearinghouse,* forums, workshops, conferences* or • Regional Issues Centers Branches of National Clearinghouse	State-based Centers to fund state/local projects registries*; associates* student internships*	Submit projects to State-based centers for re-granted funds and utilize resources and services, of other levels.
TO FACILITATE PARTICIPATION OF SCIENTISTS AND ENGINEERS IN PUBLIC ACTIVITIES	Media Programs Registries Associates Student Internships National Clearinghouse Forums, Workshops, Conferences Journals	Regional Resource Centers • Scientific Service Centers: registries;* branches of clearinghouse;* forums, workshops, conferences* or • Regional Issues Centers Branches of National Clearinghouse	State-based Centers to fund state/local projects; registries*;associates* student internships*	Submit projects to State-based centers for re-granted funds and utilize resources and services, of other levels.
TO ENABLE CITIZENS PUBLIC INTEREST GROUPS TO ACQUIRE TECHNICAL EXPERTISE	Registries Associates Student Internships National Clearinghouse Forums, Workshops, Conferences Journals	Regional Resource Centers • Scientific Service Centers: registries;* branches of clearinghouse;* forums, workshops, conferences* or • Regional Issues Centers Branches of National Clearinghouse	State-based Centers to fund state/local projects; registries*; associates* student internships*	Submit projects to state-based centers for re-granted funds and utilize resources and services, of other levels.

*Alternatives cited in option descriptions

III: OTHER PROGRAM CONSIDERATIONS

The options outlined above provide a variety of ways in which the major needs expressed in the public participation process can be met. These options, however, do not encompass all of the suggestions received about the scope and character of the SFC program. Indeed, it would not be appropriate, desirable, or possible to propose such a program, given the extraordinary range of ideas put forth. If such a program could be designed, it would raise the following problems:

- It might well be considerably removed from the three specific objectives stated in the NSF Authorization Act
- Such a program would place NSF in the position of exceeding its legal mandate if the Foundation were to assume the role of advocate
- The program would contain elements which more properly fall within the purview of other agencies or other program elements of NSF
- The program would contain elements which are already being carried out by other Federal agencies and/or by NSF.

One possible reason that some people presented suggestions which duplicate current program activities of NSF, other Federal agencies or private sector organizations may be that such persons were unaware of these activities. Another possibility is that they knew about them and were of the opinion that their particular concerns were neglected or inadequately addressed by such activities.

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The purpose of the first two parts of this section is to discuss ways in which some of the concerns not addressed by the nine SFC options have been or might be met by NSF or other Federal agencies. The last part of this section addresses certain other program options which were not included in the nine proposed.

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A. Programs of the National Science Foundation

Existing programs within the Foundation address many of the policy issues or general topical areas suggested by those participating in the SFC planning process. The majority of these activities support research by individuals and organizations. The results of their efforts are a potential reservoir of expert knowledge for citizens and public interest groups interested in these issues. These studies advance the state-of-the-art on particular topics, and contribute to the resource base upon which Federal policies are established. Projects supported by several of these programs also enhance the capabilities of scientists and engineers in their professional roles.

A description by Directorate of programs that bear on the range of topics suggested to SFC follows.

Science Education Directorate

The Office of Science and Society has two other ongoing program efforts: one, Public Understanding of Science, has previously been discussed in the media option of this report. The Ethical and Human Values in Science and Technology (EHVIST) program has as its aim increased understanding of the role that ethical and human values play in determining policies and priorities for research and technology, as well as the effects of science and technology on our ethical and value systems. Programs undertaken have included a national conference on ethical issues in the use of behavior control technologies in prisons and hospitals and a study by an inter-disciplinary team of researchers on the value issues associated with the international debate over the "limits to growth". The results of the latter will be published in a report directed to the general public. A cooperative venture with the National Endowment for the Humanities through the AAAS is to be a workshop on the science/values area.

The ongoing activities of three other divisions of this Directorate contain programs of relevance to suggestions made for the SFC program.

The Science Manpower Improvement Division (SMI)supports National Needs fellow-ships and traineeships. This program assists in providing research training to graduate and post-doctoral scientists and engineers to strengthen their research capabilities in areas of national need and to increase their instructional competencies in areas concerned with the nation's problems.

The Student-Originated Studies program addresses itself to the need expressed for undergraduate training in public policy issues. It supports student

projects dealing with local problems with immediate relevance to the community. The projects provide data useful to governmental agencies in planning or administering public programs. SMI also encourages more participation in science by women and by minorities, concerns expressed in the SFC public meetings and correspondence. The Women in Science Program supports studies to identify barriers to scientific careers for women and tests educational activities designed to overcome such barriers. The types of experimental programs underway include: visits to high schools by prominent women scientists for lectures and seminars; science career workshops for undergraduate and graduate women science students, and grants to colleges and universities to offer programs aimed at women with degrees in science who wish to update their education or re-enter careers in science and technology fields.

In addition, SMI operates a Minority Traineeship Program to provide opportunities for advanced training to talented individuals attending schools with predominantly minority enrollments. Activities related to minority groups are also the interest of the Science Education Resources program, which seeks to enhance the capabilities of science faculties at colleges and universities through support of short courses and outside research activities. These programs might provide models for training science faculty in public policy issues. The Science Education Development and Research program supports the development of course materials to maintain the quality of science education and to develop new approaches to the teaching of science. The program also provides for continuing education for practicing scientists and engineers. One grant in FY 1976

"Science and the Public Process," to Sangamon State University will support Public Affairs Colloquia for students in the natural sciences and related seminars for science faculty. While to date the efforts of SEDR have not focused specifically on continuing education in science and public policy issues, a concern expressed by a number of SFC participants, the program would be a logical place for increased NSF attention to these issues.

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Research Applied to National Needs (RANN)

The overall purpose of the RANN program is to focus U.S. scientific and technical resources on selected problems of national importance so as to contribute to their timely and practical solution. RANN's aims are to increase the effective use of science and technology in dealing with national problems, shorten the lead time between basic scientific discoveries and relevant practical applications, and provide early warning of potential national problems and initiate assessments and research useful in avoiding or solving them. The final users of its problem-focused research efforts are often policymakers in the public and private sector. Dissemination of RANN products is accomplished through its Document Center, abstract series published on program areas, and the National Technical Information Service, and selected targeted dissemination activities initiated by project leaders or RANN management. RANN's specific programs are as follows:

Resources

Related suggestions presented for the SFC program involved resource questions such as strip mining, legal problems of water and mineral rights, and energy resource exploitation.

The major objectives of RANN Resources are to identify and evaluate attractive long-term technological options for meeting national resource needs and to provide the scientific and technological basis for analyzing and formulating national and regional resource policies. The program's three areas are:

- Resource Systems, which support comprehensive analyses of the availbility and utilization of alternative resources and includes consideration of economic, social, legal, technical and environmental factors;

- Renewable Resources, which deals with selected agricultural, forest and food product problems;

- Nonrenewable Resources, which is concerned with selected mineral resource problems.

Environment

Issues of environmental interest to persons submitting suggestions for the SFC program included land use management, chemical contaminants and their effects on the ozone layer, weather modification, and earthquake warning systems.

These issues are among the topics of research supported by the RANN Environment division. Among its objectives are to identify and analyze the nature and extent of man-caused material environmental hazards; to identify and evaluate innovative social and technological methods to reduce environmental risks and to lessen the severity of disasters when they occur. Grants made during FY 1976 addressed environmental pollutants and the urban economy, advertent and inadvertent weather modification, earthquake prediction, and environmental management.

Productivity

Several issues suggested by SFC participants at the public meetings are under consideration by the RANN Productivity division. These are: the

evaluation of government programs, particularly social and health services delivery, for impact and effectiveness; alternative means of communication, such as telecommunications, and improved health care delivery and non-invasive medical instrumentation.

The Division's objectives are to improve productivity of service delivery in the public sector; to assess the benefits and costs of Federal assistance programs to state and local governments; to analyze the net effects of Federal and state regulation on industry and the public; and to facilitate the adoption of technology to improve the productivity of private sector industries, stressing the joint contribution of industry and universities.

The Public Sector Productivity program has emphasized the social and economic effects of telecommunications innovations. Other areas are intergovernmental factors which influence the cost, quality and equity of local service delivery, and the application of technology to government activities particularly computer.

The public policy area of Productivity assesses the effect - both intended and unintended - of public policies on national productivity. FY 1976 studies included the effects of deregulation of natural gas, and development of an analytic tool to determine long-run incremental costs for electric utilities' rate structures to be used both by regulatory commissions and by utilities. A Policy Analysis Source Book contained brief summaries and evaluations of policy research in areas of poverty, regulation, health, housing and other functional areas of concern to Federal and state governments.

The objective of private sector productivity studies is to apply the

knowledge and capabilities in U.S. universities and research laboratories to improving the nation's industrial productivity. Its aim is to help identify opportunities for technological improvements and accelerate productivity. One aspect of these efforts involves joint industry/ university ventures in specific geographical areas.

Exploratory Research and Technology Assessment

A number of contributors to the SFC program plan stressed the need for increased technology assessments to gauge the potential impact of important policy decisions involving science and technology in advance.

The objective of this RANN program is to support research and assessment efforts to provide greater visibility on the longer range social, environmental and economic impacts of new technology, and to identify and analyze emerging national problems which may be avoided or ameliorated by effective applications of science and technology. The program's efforts are coordinated with other Federal agencies and OTA, and are aimed at assisting policy decisionmakers. New research thrusts for FY 1977 will be on the issues posed by emerging trends toward a resource-scarce and environment-limited economy. FY 1976 awards include studies on appropriate levels of grain reserves for the U.S., energy utilization in the food processing food service industry, the energy vulnerability of alternative systems of agricultural production, and mobile communications.

Intergovernmental Science and R & D Incentives.

Mention has already been made in the Associates program option of this RANN program's activities in support of increased awareness by public officials of scientific and technological concerns.

Several other areas of public policy suggested by participants at the public meetings and in correspondence are the concern of the Intergovernmental Science Program, one being support of informational regional networks. The networks supported by this program such as the Federation of Rocky Mountain States, Mississippi-Louisiana Technology Applications Consortium, and the Fort Union Coal Formation Project have served as a source for policy research and technical information to their constituent states.

In addition, concerns about supporting innovation centers for potential entrepreneurs, and the use of small business were expressed. In the Industrial Program component, an experimental effort is underway to evaluate a Federal role in training, assisting and providing experience to potential entrepreneurs and innovators. The goal is to increase private R & D investment and technology utilization. New small business ventures and new products have resulted form these efforts.

Scientific, Technological & International Affairs (STIA)

Activities supported by the STIA Directorate encompass some of the suggestions for NSF to be involved in national polls or surveys, science indicators, information retrieval systems and information networks, as well as the identification and definition of policy issues. It provides input to policy making at the Federal level and often works in support of and with other Federal agencies.

An objective of the Policy Research and Analysis program is to provide science and technology policy research and assessment for existing and emerging national issues. Examples of recent areas of study are: the diffusion of health technology and its costs and benefits, social and private rates of return from industrial innovation, assessment of food and nutrition research needs, potential threat from depletion of stratospheric ozone by fluorocarbons, and nuclear safety.

Studies of Science Resources provide the principal source of national statistics on resources for science and technology. The objective of these surveys is to develop and maintain a current factual and analytical basis for national planning and policy formulation in the area of science and technology resources. Manpower studies, R & D economics studies, and the development of science indicators including a section of public attitudes toward science and technology are undertaken. Results of surveys and studies are published in a series of reports and summaries.

The Science Information Activities program's objectives include the building of a fundamental and theoretical knowledge base to guide development of improved science communication services; improving the economic viability

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and user-responsiveness of science information services; and provision of data and analyses for improved coordination and management of scientific and technical information systems at both national and international levels. This program has concentrated its efforts on enhancing technical communications systems and networks within the scientific community.

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Biological and Social Sciences

There are several research areas in NSF's Social Sciences program which bear directly on suggestions made during the SFC public participation process. NSF has a unique role in the Federal Government as the only agency with a broad mission to support the advancement of technique, methodology, and theory in the social sciences. As such, its social sciences program is undertaking research in the scientific development of social indicators, political implications of participatory technology, scientific analysis of public policy, and an identification of the costs and benefits of science and technology.

The objective of the Economics program is to improve understanding of economic processes and the measurement of economic relationships. Particula attention is paid to the allocation of the world's energy resources and the attendant environmental consequences.

Under its Social Indicators programs, research involving sociologists, social psychologists, economists and other specialists is supported for an effort to measure social change as objectively as possible. A national goals accounting framework furnishes a means of estimating in what ways, and to what extent, planned modifications in the allocation of available resources affecting the activities of individuals, governments, and other institutions, might be expected to alter conditions contributing to the quality of life.

The Political Science program's aim is to improve understanding of the processes through which activities of societies are coordinated through governments and adapt to changing conditions. One aspect of supported

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research is political decisionmaking, which includes research on decision-making processes at all levels of government. The Law and Social Sciences Program focuses on interdisciplinary studies involving both lawyers and sociologists, economists or other social scientists. The intent is to accelerate the use of social scientific findings in the legal world and to use methods of research developed in the social sciences to study legal processes. The results of the program's projects will serve agencies funding legal research and researchers contemplating empirical and interdisciplinary research about the legal system.

The objective of the History and Philosophy of Science program is to gain a greater understanding of the fundamental nature and the development processes of science and technology. This program supports research concerned with the development of various sciences in all historical periods and in differing cultural areas. In FY 1977, the program will also give added emphasis to research efforts on the interface of science and technology, and the historical relations between science and society, particularly in public attitudes toward scientific endeavor.

B. Related Activities of Federal Agencies Other Than NSF

In preparing the plan for the SFC program, NSF has received some programmatic suggestions from other Federal agencies and has begun the process of gathering information about related Federal efforts now underway. (The Boasberg Report in the Appendix includes considerable information concerning citizen participation at the state and local level and other related efforts sponsored by Federal agencies.) Certainly, the design and implementation of the SFC program should be undertaken with full awareness of existing efforts that relate to the objectives of the SFC program. This will allow existing resources to be fully utilized and cooperative and collaborative relationships to evolve where appropriate and needed.

Several agencies provided specific suggestions on the design of the program and offered examples of their own ongoing programs. Correspondence received from these agencies is reprinted in full in the Volume II, Appendix, to this report. Part 2 of Volume I contains a summary of this correspondence and related unrecorded communications and materials concerned with programs and services rendered during the design of the SFC program.

Environmental Protection Agency (EPA)

EPA has utilized different forms of public participation or citizen involvement in its programs. A number of EPA's programs require public participation

in the standard setting process; these have been described in detail in the Boasberg Report reproduced in the Appendix. Major environmental information symposia sponsored by EPA have involved another form of public participation. EPA will sponsor a second National Environmental Information Symposium in the next 18 months. The first, held in 1972, brought together over 1700 producers and users of environmental information, citizens, trade associations, professional societies, and governmental agencies at all levels to share ideas and discuss improved environmental information exchange. It provided a forum for demonstrating techniques and equipment for information science and systems fields. EPA plans again to "have a major portion of the program designed for and by the citizen and citizen action groups." Correspondence from EPA urged that the SFC program concentrate on meeting informational needs through efforts aimed at the transfer of scientific and technical information to the public.

Energy Research and Development Administration (ERDA)

A spokesman at ERDA reported on that agency's particular concern with "gaining public understanding of the need to conduct R&D on a broad range of energy and energy-related technologies," as well as "to instill some perception of the long lead times involved in bringing such technologies into being." ERDA has been conducting a series of public forums to obtain responses to its first National Plan for Energy Research, Development and Demonstration and to gain input for its second plan, and is developing other public participation initiatives. ERDA has also continued to sponsor the Citizens' Workshop Programs begun under AEC on energy and the environment.

Department of State

A communication from the Department of State suggested the need for better understanding by Americans of the links between science and technology and U. S. foreign policies and interests.

Department of Transportation (DOT)

Two comments on the SFC program were provided by DOT. The first was a recommendation to examine the experiences of mission agencies which have active planning assistance programs with sophisticated outreach mechanisms for citizen involvement. The second was a suggestion that the Directory of Federal Technology Transfer be used as a reference by the designers of the SFC program since many of the functions of the program were seen as directly paralleling some existing technology transfer programs.

United States Department of Agriculture (USDA)

An official of the Soil Conservation Service of the USDA suggested that policy issues under consideration include the environment and land use. The relationship of the Soil Survey to land use decisions was also suggested as a topic for consideration.

A number of other Federal efforts specifically related to SFC objectives were called to the attention of NSF during the preparation of this report, in the Boasberg Report (appendix) or at public meetings and in correspondence. These included:

Office of Technology Assessment (OTA)

The need for assessments on the potential impact of new technologies on society was cited in the public hearings and correspondence about the SFC program. OTA has been established to provide Congress with such assessments and via reports seeks to inform the public as well. Of particular interest is the current assessment of three energy-related technologies proposed for the coastal areas of New Jersey and Delaware: 1) offshore oil and gas recovery; 2) construction of deep water ports, and 3) installation of floating nuclear power plants. This assessment involves a public participation process whereby citizens and citizen organizations have been asked for their views concerning the effect of these technologies and for suggestions as to possible alternatives. They have also been invited to contribute information and data to the assessment. The experience gained in this process will be particularly useful in designing future public participation efforts by other Federal agencies.

Federal Council for Science and Technology

The Committee on Domestic Technology Transfer has published a "Directory of Federal Technology Transfer," a reference source on the Federal departments and agencies which have major programs involving the dissemination of research and development results. The directory includes extensive descriptions of agency programs and technology transfer policies, objectives,

and responsibilities, problem areas of primary focus, implementation methods, associated services and activities and a full listing of contact locations with names, agency addresses, and phone numbers.

American Revolution Bicentennial Administration (ARBA)

The ARBA Horizons '76 "Call for Achievement" program was set up to encourage and support citizen involvement in community level planning and decisionmaking. While this program is locally based, ARBA, along with other Federal agencies and private groups, has provided assistance by engaging in the following activities: publicizing community citizen involvement efforts, providing available materials and guides of use to citizens in organizing involvement programs, and providing a mechanism to bring citizens and sources of information together. Examples of programs being supported that have direct relevance to SFC, include (1) developing and establishing model citizen-initiated Community Resource Centers for the purpose of improving participation in local policy planning by providing citizens access to information on their community, its resoruces and policies; and (2) participating in support of a three-year research project by a non-profit organization, Citizen Involvement Network, to study and evaluate a small number of community-based citizen organizations in order to determine various ways in which citizen participation can be best utilized and cooperation among local groups achieved to effect desirable change.

Library of Congress

The Science and Technology Division operates the National Referral Center to assist persons wanting information in all fields of science and technology. The center itself does not provide answers to these inquiries, but it maintains a specialized updated subject-indexed inventory containing descriptions of some 9000 "information resources." These are public and private organizations, institutions, groups or individuals with specialized knowledge in a field who are willing to share this knowledge.

Persons with requests for information are provided the names, addresses, telephone numbers and brief descriptions of pertinent information resources, and each response is individually geared to the inquiry.

General Services Administration and Civil Service Commission

In a joint venture, these agencies have established Federal Information Centers in 36 cities, with telephone tielines to nearby centers in additional metropolitan areas. Center personnel handle requests for information about services and resources provided by government programs and agencies. Responses are provided by phone, mail or in person.

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C. Program Options Not Proposed by NSF

During the SFC planning process, there were some program options presented by participants which NSF has decided it should not propose. These decisions are based on Foundation policy or legal constraints. These suggested options, and the rationale behind NSF's decision, follow.

- Direct Funding of Public Interest Groups

Proposed Program Option: One program option discussed at length in the public meetings and often put forth in written submissions was that NSF should grant funds directly to non-profit community organizations and citizens public interest groups. These groups can and do successfully seek research and project funds from NSF. They must meet the same criteria that any applicant must meet in order to qualify for grants. Lack of adoption of this proposed program option would in no way affect current or potential funding from other NSF programs for such groups.

This option proposes that the SFC program provide general grant support for the ongoing activities of citizens community organizations and public interest groups. Among the many activities which these grants might thus support were the following:

- Hiring professional staff with scientific and technological competence
- Payment of fees to scientists and engineers serving as consultants on short or long term projects
- Conduct of research and preparation of reports for use in local/state/Federal regulatory proceedings, judicial litigation and the legislative process
- Educating the public about policy issues with scientific or technological impact through newsletters and journals
- Payment of travel expenses to allow citizens to participate in legislative, executive and judicial proceedings and attend conferences or courses on relevant topics

- Providing funds for information mailings
- Monitoring and evaluating the efforts of specific governmental agencies and industries, and making these results known to the public through the media
- Facilitating the use of professional expertise by citizens and community groups.

Groups could apply individually or form consortia to receive grants.

The suggested policy areas in which these grants could be made were as diverse as the types of organizations and groups presenting statements. Among the suggestions were general topics such as energy, the environment, transportation, land use, land and resource management, public health or topics pertinent to local concerns such as: studies of environmental problems unique to high-altitude locations, such as special air quality and soil quality (Colorado Open Space Council); review of proposals for oil refineries on the Columbia River (Oregon Environmental Council); hiring of scientists to explore alternative ways, such as recycling, to handle city garbage (San Francisco Study Center).

Extremely diverse ranges of policy issues were identified by local citizens groups across the country, and the purposes to which grants could be put were equally diverse. Thus it appears, based on the experience of a number of those presenting suggestions, that the most effective mechanism for implementing this option would be to establish a citizens advisory council to the SFC program at the national level. The council would set overall

policies for the program and regional advisory councils would be established to review applications for local grants. It was suggested that the majority of council members would be volunteers representing broad areas of the public interest sector.

Several criteria for selecting the members of these councils were suggested at the Washington, D. C. meeting by James Sullivan, co-director of the Center for Science and the Public Interest and research director of the National Council for the Public Assessment of Technology.

He characterized most community and public interest groups as issue oriented, without adequate funding by corporate and government standards, largely staffed by volunteers, and usually sophisticated politically and only sometimes technically. These traits, he felt should "serve as criteria for selection of advisory council members and for designing the audience to whom the [program] will be directed."

However, Sullivan continued, while citizen organizations share these common traits, individually they are very different in their goals--the policies they want established and the interests they want to be served. Council membership should be broadly representative of the public interest community and reflect the makeup of coalitions that grow up around many issues where "...you see...representatives of labor, management, Blacks, minorities, environmentalists, consumers, etc." The experience is there in the public interest community Sullivan stated, and could be tapped for the purposes of the SFC program.

Direct grant support was proposed to remedy the current lack of funding and the specter of lessened support. As Brian Ketchum, Vice President of Citizens for Clean Air, New York City, stated: "It must be emphasized that funding is a critical problem with all local public interest groups; it is not just Citizens for Clean Air that has problems. Public support in the form of contributions dried up well over three years ago, and foundation support evaporated with the recession. What will remain is what can be secured from government agencies. The outlook for survival of the public interest community, especially local groups, is grim indeed without any funds."

Such support was also viewed as a means of bringing about direct citizen participation in the resolution of public policy issues involving governmental agencies. As James Sullivan stated in a separate letter to NSF that "Citizens by and large are now excluded from such direct participation by the highly legal nature of most proceedings, the technical sophistication necessary to take part in debates, and the lack of time and money to devote to participation.....The issue at stake is clearly one of control. Citizens want to be more of an equal partner in the technological decision making process. They want to help make decisions rather than passively observe others make them."

Concern was expressed over the need for redressing the perceived imbalance between financial and manpower resources of public interest groups on one hand and those of government and industry, on the other. Citizen groups cited this imbalance, accompanied by the need for greater access to policy

decision making, as the factors impeding their rightful participation in the governmental process. At the San Francisco meeting, Stephen Anderson of Sierra Club Research, stated that by providing direct assistance to public interest groups the expense and time involved in extensive litigation would be lessened.

NSF View of Proposed Option

The reasons given for adoption of this option have been taken into account in the nine program options suggested by NSF. These options would provide a range of resources, services and activities which could directly benefit citizens public interest groups. They will meet some, if not all, of the concerns expressed. The State-based centers option could be a potential source of needed support.

Thus, exclusion of the suggested direct funding approach in NSF's proposed options is in no way meant to reflect a negative NSF attitude toward the role of these organizations in our society. On the contrary, based on the record to date, there is ample evidence of the contributions which citizens organizations and public interest groups have made to improving the public's understanding and concern for scientific and technological policy-related issues. NSF believes that these efforts should be enhanced, and has suggested various means of doing so.

In addition, one of the purposes of NSF support of the Boasberg report was to obtain an analysis of activities relating to citizen participation involving scientific and technological concerns. This report has not only

been useful for the SFC design, but also could itself be of benefit to the public. The report describes the key leverage points offering citizen groups the best opportunity for influencing decision making. The substantive steps of this process described are: legislative policy formation, OMB circular A-95 review, rulemaking and adjudications, informal agency actions, and agency appeals and judicial review. Boasberg also reviewed the procedural points which citizen organizations should consider in improving their access to administrators. These include cost reductions in filing and copy distribution, documentation of public participation, and citizen input into the budgetary process. Special statutes calling for greater citizen participation in policy formulation also reviewed in the report are the National Environmental Policy Act, State NEPA's, the Federal Water Pollution Control Act and Vermont's Act 250 pertaining to Land Use Planning.

If the SFC program is to be responsive to the inputs received in the planning process, it should address the wide range of needs of all who are concerned with gaining access to and utilizing scientific and technological resources. Considerable testimony addressed the need for assistance to individuals and a number of questions were raised as to whether public interest groups represented all citizens. The program could not justifiably be limited to or expend the majority of its efforts for citizens public interest groups if the full range of expressed needs are to be taken into account. If these groups were to be singled out, the program would effectively be discriminating against those who are not part of such groups.

Thus, while the nine options could assist public interest groups, they would also aid citizens, public officials, industry, media organizations, as well as others.

The argument has been made that since citizens public interest groups do not now have sufficient resources to participate fully in governmental decisionmaking, Federal support should be provided for that purpose. Reference is made to examples of such assistance, such as that provided by EPA, as a rationale for NSF's undertaking such a program. This questions is still open to debate. On the other side of the argument are questions about the role of the Federal government in society and whether Federal funds should be given directly to local public interest groups.

It is NSF's view that the Foundation does have a role to play in support of certain activities of citizen public interest groups. This role is based upon NSF's charter to improve understanding of science at all levels and to promote the health of the nation through scientific research and related activities.

NSF's expertise lies in its role as a supporter of innovative and experimental research projects in the scientific and technical areas. This justifies its assuming responsibility for a program which can provide such resources to citizens, scientists and engineers, and citizens organizations, and which can contribute to public understanding of public issues.

However, the direct funding option would potentially support advocacy activities that affect legislative, administrative or judicial proceedings at other governmental agencies. While such intervention is not the only function with which these groups are concerned, it often comprises a significant amount of their operating activities. If NSF were to provide direct assistance, it would be going beyond the Foundation's present mandate and performing functions thought to be inappropriate to its mission. Therefore NSF has not proposed the direct funding option.

NSF in an Advocacy Role

Several suggestions were received that NSF itself assume an advocacy position on specific issues such as the B-1 Bomber, on birth control, and on population programs. NSF, as presently chartered, can serve in the role of an initiator and supporter of specific activities relating to the effects of scientific applications upon society. However, the Foundation would seem to be directed to perform this role not as an advocate, but as an appraiser, an appraiser concerned with the impact of such applications upon the human welfare.

The preamble to the Act that established NSF and the Act itself appear to support this interpretation of NSF's role. The preamble states, in part, that the NSF is "to promote the progress of science (and) to advance the national health, prosperity, and welfare." The Act authorizes the Foundation, among other things, to initiate and support basic and applied scientific research and programs to strengthen the potential of such research, and to appraise the impact of scientific research upon the general welfare. While NSF is charged with advancing the national welfare, it would seem to be directed to carry out this charge as an initiator and supporter of research and related activities and as the appraiser of the impact of research upon the national welfare, not as an advocate.

- Option of Recommending No SFC Program Be Established

The possible recommendation of not establishing a Science for Citizens Program should be considered. The Foundation has not previously been involved in citizen participation activities. Its role has been primarily to support research-oriented projects in science and technology. Whether the Foundation is well equipped to take on this new role is a question which warrants some discussion.

As a corollary to this, some have stated that NSF's ongoing activities already fund many of the subject areas proposed during the SFC planning process. Thus, it might be either duplicative or unnecessarily expensive to establish a new SFC program.

Further, the Boasberg report points out that there are administrative mechanisms which are intended to enhance citizen participation at both the state and Federal levels. Among these are program advisory councils, office of public advisor, office of public advocate, direct financing of public comment and intervention. Outside support for these mechanisms as a substitute for an NSF program could be considered as an alternative to an NSF SFC program.

Given these considerations, however, NSF has not proposed the option of no program. No private sector group or combination of private sector efforts appear to have the capacities of the proposed program to meet the identified needs and provide for a range of services and resources. While NSF does fund extensive programs closely related to SFC policy concerns, most are research oriented and are not directed at the SFC objectives. Certainly, if there were other public programs designed to accomplish the SFC objectives, NSF should not implement a program. However, present indications are that no public pro-

gram seeks to accomplish these objectives.

Given NSF's role to improve the understanding of science and technology at all levels, many of the SFC functions are seen as being appropriate for the Foundation to undertake. If alternate means are found to finance citizen participation through the mechanisms described in the Boasberg report, an SFC program would complement, not duplicate, them. Therefore, in view of the current lack of a private program and the appropriateness of certain activities to NSF's overall mission, the no program option has been rejected.

Expression of public support for the program was almost universal from those who made their views known. One letter was received from a citizen who felt that the SFC program would be a waste of money at the expense of a balanced budget.

But the bulk of opposition to establishment of an SFC program was voiced by individuals concerned about "Man, A Course of Study" (MACOS) and other pre-college science curricula efforts of the Foundation.

Including those who attended the SFC meetings, the number of dissenting views presented numbered about 50. Roughly 80 per cent of these writing, mentioned affiliation with organizations, the most predominant mention being of the National Congress for Educational Excellence. Groups voicing their disapproval of the program were:

The National Congress for Education Excellence
Guardians for Traditional Education, Prince Georges Co., Md.
The Indiana Coalition for Children and Basic Education
Parents Concerned About Education, Seaford, N.Y.
Concerned Citizens and Taxpayers for Decent Schoolbooks,
Baton Rouge, La.
The American Party of Arizona

Concerned Parents, DeWitt, N.Y.

The Greater Northwest Civic Association, Chicago, Ill.

Concerned Adults Researching Education, Prince Georges Co., Md.

The American Conservative Union, Washington, D. C.

The Family Preservation League, Columbus, Ohio

The National Coalition for Children, McLean, Va. and Memphis, Tenn.

Grass Roots of America, Inc., Morris Plains, N.J.

Happiness of Womanhood, Inc., Dearborn Hts., Mich.

Parents and Taxpayers, San Francisco, Ca.

Citizens for Youth, Kennewick, Wa.

Citizens for Responsible Education, Burleson, Tx.

Women Who Want to be Women

Parents Who Care, Montgomery Co., Md.

Citizens United for Responsible Education, Montgomery Co., Md.

The Parents Action Committee, Alexandria, Va.

Of those writing, roughly half made mention of the Science for Citizens program plan. The rest limited their remarks to criticism of NSF policies in funding of curriculum development and implementation efforts and requested that their statements be included in the SFC hearing record.

Among comments criticizing the SFC program were the following:

"We are greatly concerned that Congress has opened the door to yet another NSF program to dispense large amounts of taxpayer dollars for Federal government-sponsored interference with the social, moral, spiritual, political and economic preferences of individual citizens and local communities..."

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"We have the impression from what is already known about the ... program that it is designed to put NSF in the 'Nader raider' business."

Another stated:

"The Science for Citizens program is a scheme whereby 'Science Advisers will be funded to work closely with governments' staffs, state legislators, mayors and city councils to enact the legislation and government action which NSF needs to promote social, political and economic change that will be in accordance with the human engineering policies of NSF."

Other direct critiçism of the SFC program centered on its being a "potential behavior modification" device and a tool for further Government intervention in private affairs and an attempt to erode traditional values.

One of the reasons presented for NSF to abdicate its role in curriculum development activities for elementary and secondary schools was that such efforts in effect placed NSF in an advocacy posture. At the Washington meeting, Miss Judith Almquist representing the Parents' Action Committee stated:

"In just a little over 15 years, the National Science Foundation has poured out more than 180 million dollars in taxpayer money to a very few non-profit organizations who are in the business of completely changing American education...[to] develop, promote, and market their brand of social science curriculum."

Miss Gayle McGlaughlin supported this view when she stated that "...it is an attempt by a small group of individuals to decide what views, opinions and attitudes are appropriate to be taught..." She continued, "When the government participates in curriculum writing, it is determining what shall or shall not be taught."

Several doubts were expressed about the purpose of the regional meetings:

> "We feel that this is an attempt to gain public approval by bringing in strong NSF supporters to neutralize the opposition against NSF programs such as the outrageous 'Man: A Course of Study', 'Exploring Human Nature' [and others]..."

A recurring criticism of NSF, not specifically leveled at the SFC program, was that NSF had spent $2 million in government money to support the "socialist economic planning research of Soviet-educated economist Wassily Leontief...leading to the sovietization of the American economy." Most summed up their comments by demanding that NSF be removed from "all social and behavioral sciences and from all curriculum activities."

Many of those expressing these views indicated awareness of the March 1975 Congressional directive that NSF defer further funding of implementation activities pending a thorough review of curriculum implementation policy. NSF panel members at the public meetings called attention to a report prepared for the House Committee on Science and Technology in November 1975 "National Science Foundation Curriculum Development and Implementation for Pre-College Science Education." This report includes the findings of a GAO

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investigation of NSF procedures for developing, evaluating and implementing science education projects; an independent panel review findings undertaken at the request of Congressman Teague; and a separate NSF study requested by Director Stever.

Additionally, the December 1975 NSF evaluation of 19 active pre-college curricula by 7 panels, made up of 73 individuals was cited. Represented on these panels were parents, public interest groups, scientists, educators, child development psychologists and publishers.

While the Foundation is not proposing the no program option, all comments concerning the program's content will continue to be considered if the Congress should approve implementation of a Science for Citizens program.

IV. THE SCIENCE FOR CITIZENS PLANNING PROCESS

The process undertaken to develop the SFC program plan was unique for NSF. In response to congressional guidelines, opportunities for extensive public input were provided in the planning process. The wealth of resulting ideas formed the basis for the Foundation's development of program options. The availability of this material will be of invaluable assistance in the actual launching of an SFC program.

Summary Review of the Planning Process. NSF's planning of the SFC program began shortly after the NSF Authorization Act was signed into law. On August 27, 1975, NSF Deputy Director Richard Atkinson established an interdisciplinary NSF Task Force to develop the Science for Citizens Program plan. Dr. Jack Sanderson, then Acting Deputy Assistant Director for Science Education, was named Task Force Chairman. The functions of the Task Force were to provide guidance during development of the program plan and to devise ways to ensure broad public participation in the planning process.

To aid in the initial planning process, a number of individuals who have been active in the arena of public involvement in policy issues were invited to address the Task Force. Topics discussed included, but were not limited to, the operation of the state based programs of the National Endowment for the Humanities; the role of public "intervenors" in nuclear plant licensing and siting; public requirements for technology assessment; characteristics of public interest groups; and the function of advocacy organizations and legal service bureaus.

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The Task Force also determined that a review and analysis of the implications of Federal assistance to nonprofit citizens organizations for acquiring necessary scientific and technical expertise would be useful in designing the SFC program. Accordingly a contract was signed with the law firm of Boasberg, Hewes, Finkelstein and Klores for the preparation of a report entitled "Citizen Group Requests for Federal Assistance in Dealing with Scientific and Technical Aspects of Public Policy Issues." A copy of this report may be found in the Appendix.

In order to respond to the requirement for public involvement in the planning process, it was decided that a campaign would be launched to solicit written participation and that a series of regional public meetings would be held. On October 14, a sole-source contract was awarded to the Association of Science-Technology Centers (ASTC) to coordinate and provide logistic support for the meetings. ASTC is a Washington-based non-profit organization representing 40 science and technology museums in the U. S. Alternate meeting sites were considered such as universities, hotels, and conference centers, but it was agreed that the ASTC sites were suitable and that negotiation of a single contract would provide NSF the benefit of the museum's already established resources and media contacts, and would provide a readily accessible coordination point in Washington.

A notice was published in the Federal Register of October 31, 1975, outlining the congressional mandate, delineating the purposes of the proposed program and soliciting public participation in the form of written statements. These were to be received by the Foundation by January 10 or by the host organization 24 hours

prior to the meeting. It was announced that all statements received would be included in the record to Congress. The sites and dates selected for public meetings were:

December 1 - Museum of Science and Industry, Chicago, Illinois

December 8 - Fernbank Science Center, Atlanta, Georgia

December 9 - The Garden Center, Dallas, Texas

December 10 - Museum of Natural History, Denver, Colorado

December 12 - The Exploratorium, San Francisco, California

December 15 - National Academy of Sciences, Washington, D. C.

December 16 - Museum of Science, Boston, Massachusetts

A letter dated 4 November containing a reprint of the Federal Register announcement was sent to some 24,600 individuals and organizations, including an estimated 5,000 public interest groups. It contained the objectives of the program and invited suggestions on the content and conduct of the planned program. In addition, invitations to the public meetings were extended to all governors, to senators of host states and mayors of host cities and to all Congressional representatives in and contiguous to the cities where meetings were scheduled. A press release was sent November 6 to 5,431 newspapers, magazines, feature writers, businesses, Federal coordinators of universities and colleges, NSB members past and present, presidents of state science academies and to Congress.

Host organization publicity took the form of press releases, flyers, letters to museum subscribers, and radio and TV public service announcements based on materials supplied by NSF. As an example, the Exploratorium in San Francisco provided information to:

- 150 Bay Area radio and television stations including college radio stations;
- 25 national and state press organizations;
- 133 primary and secondary newspapers in the 5 Bay Area counties;
- 28 ethnic newspapers;
- 35 college newspapers;
- 80 public meeting places (coffee houses, theatres);
- 425 special interest groups--ecology, nuclear power, business, research, consumer, etc.

Nonetheless, many complaints were received at the public meetings and by telephone and mail that indicated the publicity had been inadequate. The issuance of press releases did not guarantee their being printed. The publicity efforts of the science and technology museums would have been aided had the drawing card of local participant names been available well before the meetings. However, the program was purposely set up to allow people to indicate their interest in personally submitting statements as close to the meeting time as possible. It is felt that paid advertisements and announcements would have had greater impact.

As requested, representatives of the host organizations supplied the Science for Citizens task force with a list of suggested local speakers. These were to include as broad a representation of the public as possible from scientists and academicians to representatives from business, labor, rural areas, minority groups, state and local government and public interest groups. Mailgrams were sent by NSF to some 20-30 suggested speakers prior

to each meeting (with the exception of the Chicago meeting where time limits prevented it). Follow-up by telephone was performed by host organizations and NSF personnel.

Meetings, as announced in the Federal Register, were divided into two three-hour segments--one in the afternoon, one in the evening--with approximately the last half of each given over to general discussion of the issues raised and plans put forth. A panel of NSF representatives was present at each meeting.

Invitations were extended to members of the National Science Board to participate as panelists at the meetings. Those who did were: in Chicago, Dr. Saunders MacLane; in Atlanta, Dr. Joseph M. Reynolds; in Dallas, Dr. Lloyd M. Cooke and Dr. James H. Zumberge; in Denver, Dr. F. P. Thieme; in San Francisco, Dr. William A. Nierenberg; in Washington, D. C., Dr. Robert A. Charpie; and in Boston, Dr. Anna Harrison.

NSF staff members who served as panelists in the seven cities were:

Dr. Richard C. Atkinson, Deputy Director, NSF; San Francisco

Dr. Harvey Averch, Acting Assistant Director for Science Education; Chicago and Washington

Dr. Laura P. Bautz, Senior Staff Associate, Mathematical and Physical Sciences and Engineering; Atlanta

Mr. Charles F. Brown, General Counsel, Atlanta, Dallas, Denver, and San Francisco

Dr. Lynn Carroll, Office of Government and Public Programs; Chicago

Dr. T. O. Jones, Special Deputy, Directorate for Scientific, Technological and International Affairs; Chicago

Ms. Maryann Lloyd, Deputy General Counsel; Chicago, Washington, Boston

Ms. Patricia J. McWethy, Special Assistant to the Director; Atlanta, Dallas and Denver

Dr. Jack T. Sanderson, Acting Deputy Assistant Director for Science Education; moderator at all meetings

Dr. Allen M. Shinn, Office of Program Integration, Science Education; Atlanta, Dallas, Denver and San Francisco

Dr. Joel Snow, Director, Office of Planning and Resources Management; Boston

Mr. John Talmadge, Director, Communications Programs, Research Applications; all meetings

Dr. M. Kent Wilson, Deputy Assistant Director for Mathematical and Physical Sciences and Engineering; Chicago, Dallas, Denver, San Francisco, Washington and Boston.

The following table presents approximate attendance figures at each meeting and, based on the transcripts of each meeting, the number of persons giving presentations for the record or commenting from the audience. Attendance figures must remain approximate because not all attendees at each meeting completed the registration forms provided.

DATE	SITE	TOTAL ATTENDEES AFT.	TOTAL ATTENDEES EVE.	NUMBERS PRESENTING VIEWS ON S. F. C. FOR RECORD[1]* AFT.	NUMBERS PRESENTING VIEWS ON S. F. C. FOR RECORD[1]* EVE.
Dec. 1	Chicago	40	17	11	10
Dec. 8	Atlanta	78	51	10	11
Dec. 9	Dallas	100	60	15	8
Dec. 10	Denver	56	22	15	9
Dec. 12	San Fran.	150	60	21	17
Dec. 15	Washington	170	90	17	26
Dec. 16	Boston	150	50	21	14

*as reflected in actual transcripts

1/ It was stated at each meeting that comments received on the registration forms would be included in the record as well. These comments were analyzed and incorporated in the development of programmatic options, but are not reflected in these figures.

Some suggestions for content and conduct of the Science for Citizens program were received at NSF following the notification of 31 October in the Federal Register; however, the bulk of the mail received by the Foundation appears to have been elicited by the letter of 4 November. The total number of papers received both by mail and at regional meetings exceeds 1,400.

These communications along with the transcripts of regional meetings formed the basis for development of the programmatic options presented in the body of this report. Analysis of the material was begun the last week in December. Preliminary findings were presented to the Advisory Committee for Science

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Education at its meeting on 6 January. Committee recommendations are found in the Appendix.

A draft outline of the final report was prepared identifying the programmatic options developed from the analysis of submissions, and their advantages and disadvantages. This draft was circulated for comment to members of the NSF Executive Council and SFC Task Force and met with general approval. It was then presented to the Program Review Committee of the National Science Board on Wednesday, 14 January, and to the full Board on Thursday, 15 January. This draft was extensively augmented between 14 January and 2 February. The augmented draft version was sent to Task Force members on 2 February. A meeting of the Task Force was convened on 4 February. Comments received in memoranda, by phone, and at the Task Force meeting were taken into consideration in the present draft of this report. This draft has also been reviewed by other Foundation officials prior to its submission to Congress.

V. DESCRIPTION OF MATERIALS IN VOLUME II, APPENDIX

Publication of Appendix

Volume II, Appendix to this report, contains virtually all* of the materials which were submitted to the Science for Citizens Program at the seven public meetings or through correspondence. Due to printing limitations resulting from the size of the document, the Appendix has not been published concurrently with this report. A notice will appear in the Federal Register when it becomes available.

Materials in Appendix

The appendix will include the following:

1) Presentations related to the seven public meetings
   - the verbatim transcripts of the seven meetings that were held;
   - the supporting material and correspondence submitted by those providing testimony;
   - registration forms which included comments and suggestions from those attending the meetings;
   - lists of attendees at meetings (those who filled out registration forms)

2) Correspondence, with or without accompanying statements, of those not providing testimony in the meetings.

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*Certain submissions which were not reprinted included very extensive examples of programs or proposals and duplicate materials, as well as tape cassettes.

3) Other material submitted (generally booklets and brochures) on a variety of programs and activities, or materials concerned with specific or a range of policy issues.

4) "Provision of Federal Assistance to Nonprofit Citizens Groups Dealing with Scientific and Technical Aspects of Public Policy Issues." A Report to the National Science Foundation prepared by Boasberg, Hewes, Finkelstein and Klores, Attorneys at Law, 1225 Nineteenth Street, N.W., Washington, D. C. under Contract NSF-C7610296, January 26, 1976.

This report, referred to in the text as the Boasberg Report, was prepared for SFC program planning process. It contains information on existing administrative mechanisms for enhancing citizen participation, leverage points in the administrative process most suitable for citizen input, a discussion of the pros and cons of federal assistance and NSF assistance to citizen groups.

5) 1976 program recommendations of the Advisory Committee on Science Education

6) Newspaper clippings and other public information materials related to the seven public meetings.